HORTICULTURAL ABSTRACTS

Vol. XV September 1945 No. 3

INDEX OF CONTENTS.

The initialled review is by W. G. Keyworth of the East Malling Research Station.

MISCELLANEOUS.

General.

947. ANON. 634/635: 371.2/3
Swanley College. Pending amalgamation with Wye.
Fruitgrower, 1945, **100**: 49.
The Swanley Horticultural College (for women) is, to amalgamate with the South-Eastern Agricultural College, Wye, in the autumn of this year.

948. LENIN ACADEMY OF AGRICULTURAL SCIENCES. 63(47)
A meeting of the active members and directors of institutes of the Lenin Academy of Agricultural Sciences. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1944, No. 1, pp. 42-7.
Among the points discussed at a meeting of the Lenin Academy of Agricultural Sciences in December 1943 were the following:—The use of wood smoke and soot as insecticides. Lysenko's method of increasing seed germination by aeration and heat and his suggestion for planting newly harvested potato tubers in August. New soybean hybrids. Cold resistant apple stocks and strawberry hybrids. The observation that fruit tree root systems suffered more cold damage after dry than after wet autumns. Devices for facilitating cross-pollination. Air drying fruit and vegetables.

949. BUENOS AIRES. (PEDRO MAROTTA, F.) 63(82)
La Facultad de Agronomía y Veterinaria en la Universidad. **(The Faculty of Agronomy and Veterinary Science at the University of Buenos Aires 1936-40**
B. Aires, 1943, pp. 664.
A handbook on the activities of the Faculty of Agronomy of Buenos Aires during the period 1936-40 by F. Pedro Marotta, who was Dean during that period.

950. MEUNISSIER, E. 41.312.1
Doit on dire "le" ou "la". **(The genders of French plant names.)**
Rev. hort. Paris, 1943, **115**: 396-8.
There is some confusion even in France as to the genders to be attached to plant names. This the writer endeavours to dissipate by citations from horticultural literature. Since it is possible to provide examples of the use of both *m* and *f* for each of the 31 plants discussed, decision is often difficult. The bibliographical notes, however, contain much of interest.

951. GERICKE, W. F. 663.61: 631.589
The meaning of hydroponics.
Science, 1945, **101**: 142-3.
The author explains why the word hydroponics was chosen for the art and science of crop production without soil. The word means water working and it is water that in soilless culture influences both dynamically and physiologically the growth, form, and activities of the roots and through them the other plant characters. In agriculture the functions of water are physiologic only, since the solid matter of the soil provides the dynamic functions. The dynamics of water, the chief non-nutrient material used in hydroponics, is the foundation on which the art and science of hydroponics is formulated. The word agriculture which infers land should never be used in connexion with hydroponics. Thus the expression soilless agriculture is contradictory in meaning and implication.

Technique.

952. CHOPINET, R. 576.312.3
Autopolyploïdie expérimentale. **(Experimental inducement of polyploidy.)**
Rev. hort. Paris, 1944, **116**: 53-4, bibl. 18.
A brief review of the methods by which polyploidy in plants can be artificially brought about. Many authors are named in the text without appearing in the list of references.

953. CAMPBELL, W. A., AND PRESLEY, J. T. 581.08
Design for constant-temperature tanks.
Phytopathology, 1945, **35**: 213-6.
Constant-temperature tanks were constructed for use at Salinas, California, under the Special Guayule Research Project, of whatever material happened to be available, and proved so satisfactory that it was decided to publish the details of construction. They were used to study the relation of temperature to infection by soil fungi.

954. BRUNEL, A. 631.423 + 581.192
Dosages des nitrates dans les tissus végétaux et dans le sol. **(Nitrate determination in plants and soil.)**
Trav. Sect. tech. Agric. trop. Minist. Colon. France, Ser. **1**, 1944, pp. 5-8, bibl. 3.
A method is described whereby the nitrates in vegetable tissues and in the soil may be determined with an error of less than 3%.

Physiology.

955. SEMENOVA, O. S. 581.144.2
Age variations in the absorbing activity of root systems.
C.R. Acad. Sci. U.R.S.S., 1944, **43**: 354-6, bibl. 11.
The active and passive water absorption by roots of *Vicia faba* plants grown in water on Knop's solution was measured at the Timiriazev Institute of Plant Physiology. The daily absorption of water and of the minerals K, Ca, P was determined by putting the roots into volumeters of the type used by Sabinin and Kolosov. With some plants transpiration and thereby the passive absorption of water was reduced by increasing the relative humidity of the air. The results are presented in a graph which shows that the maximum rate of absorption of minerals per unit of root was attained when the plants were 24 days old, bearing 6-7 leaves and starting to form lateral shoots. The following figures are given for absorption in 24 hours per unit volume of root at different ages: Phosphorus: 24 days, 53 γ; 39 days, 17 γ; 52 days, 7 γ. Calcium: 24 days, 57 γ; at the age of 41 days the roots were secreting some of their own calcium into the nutrient solution. In the case of potassium the decline was even more pronounced. In contrast, the rate of water absorption per unit volume remained almost constant when the relative humidity of the air was high. When at the age of 52 days the relative humidity was reduced to 70% of its previous value, the rate of water absorption increased 300% as compared with the controls. It is held that this increase is due to enhanced transpiration and must therefore be regarded as passive absorption. Since there was no parallel increase in the absorption of mineral nutrients it is concluded that the absorption of the latter is largely an active process.

956. RATNER, E. I. 581.11: 631.8
On the correlation between the absorption by plants of water and mineral substances and on the role of internal agents.
C.R. Acad. Sci. U.R.S.S., 1944, **45**: 165-8, bibl. 10.
Twelve-day-old plants of Indian corn were transferred from a diluted Helriegel nutrient solution to a suspension of very fine-ground permutite saturated up to 30% with K and up to 70% with Ca, and were kept at different levels of air humidity. The discussion of the results, which elaborates the hypothesis that the direction of the movement of ions (cations) from the external to the internal root cells and to the above-ground organs is chiefly determined by the respiration of the cells, includes the following conclusion: In plants with a low content of mineral nutrients and at a high level of activity the migration of minerals takes place mostly through the phloem, while in plants with a high content of minerals it proceeds largely through the xylem, depending on the rate of transpiration. The last-mentioned form of migration is thought to prevail on saline soils, where transpiration is regarded as the main cause of salt accumulation. It is suggested that cultivation methods for crops on saline soils, especially under artificial irrigation, require some modification taking this point of view into account.

957. RATNER, E. I. 581.144.2: 631.432
Interaction between roots and soil colloids as one of the problems of the physiology of mineral nutrition of plants. III. Age variation in the desorbing ability of the plant. Influence of wilting in the case of moisture deficiency.
C.R. Acad. Sci. U.R.S.S., 1944, **44**: 37-40, bibl. 2.
The test plants used at the Timiriazev Institute of Plant Physiology were oats.

958. KRASINSKIĬ, N. P. 581..04
The oxidation-reduction conditions of plants with reference to their fume resistance. [Russian.]
J. Bot. U.R.S.S., 1944, **29**: 257-63.
When leaf cells contain only small amounts of water-insoluble substances subject to oxidation, the plants suffer less scorching than those in which photo-oxidation is more active. Species of the *Solanaceae* and *Cruciferae* belong to the first group; those of the *Polygonaceae*, *Leguminosae*, and *Saxifragaceae*, to the second. The *Ranunculaceae* occupy a less definite position in this connexion.
As the leaves grow older, the "oxidisability" of their cell contents increases among the *Leguminosae*, *Ranunculaceae*, and *Saxifragaceae*, but decreases among the *Cruciferae*.
It is believed that once the oxidation and reduction processes in plants are understood, it will be possible to choose suitable species for planting in smoke- and gas-ridden industrial areas, where they will not succumb to the acid atmosphere of SO_2 and other fumes.

959. BURRIS, R. H., AND HAAS, E. 631.461
The red pigment of leguminous root nodules.
J. biol. Chem., 1944, **155**: 227-9, bibl. 5.
The spectrum of the red pigment of leguminous root nodules is described in a diagram and the possible role of the pigment in respiration is discussed.—Universities of Wisconsin and Chicago.

960. KRAMER, P. J. 581.14: 631.432.2
Soil moisture in relation to plant growth.
Bot. Rev., 1944, **10**: 525-59, bibl. 108.
The subject is dealt with under the following headings: Soil and its physical characteristics, soil moisture classification, soil moisture terminology, movement of soil moisture, availability of soil moisture to plants, measurement of soil moisture, experimental control of soil moisture.

961. MAGISTAD, O. C. 631.415.3: 581.14
Plant growth relations on saline and alkali soils.
Bot. Rev., 1945, **11**: 181-230, bibl. 362.
In this connexion, only a few conclusions arrived at by the author from a discussion of the literature can be mentioned: (1) In saline soils (salt content at least 0·1% in case of chlorides and 0·2% in that of sulphates) the amount of water available is determined by the osmotic pressure of the soil solution. (2) The reasons listed for reduced plant growth as a result of decreased water absorption include: salting out of cellular proteins, plasmolysis, irreversibility of hydration of cell contents and interference with ion accumulation. (3) In alkali soils (with an exchangeable sodium plus potassium content of at least 12%) lack of oxygen in the soil air due to waterlogging is in many cases believed to be responsible for stunted growth. (4) High concentrations of certain salts were found to affect the assimilation of nitrogen compounds and the accumulation

of carbohydrates, while starch formation has been shown to be inhibited by high chloride concentrations. (5) By some authors the unfavourable effect of alkaline soils is ascribed to a breakdown in the calcium regime in addition to unfavourable physical conditions. (6) The high pH values of alkaline soils are usually associated with unavailability of iron, manganese, phosphates and occasionally nitrates. (7) Heavy applications of soluble fertilizers may constitute a source of high osmotic pressure in soil solutions, especially on sandy soils.

962. Potapenko, A. I. 612.014.44
A contribution to the problem of photoperiodism physiology.
C.R. Acad. Sci. U.R.S.S., 1944, **45**: 84-5, bibl. 3.
As a result of his experiments carried out with *Bidens tripartitus* under three photoperiodic conditions the author advances the theory that the recovery of the chloroplasts from their photosynthetic activity requires time and energy expenditure on the part of the plant. With short day plants the elimination of light during the night phase is necessary for the restitution of the chloroplasts. The conditions under which the recovery at night of the photosynthetic apparatus takes place determine the working capacity of the chloroplast during the next day or even for several days. The effect of the photoperiod on the assimilates and on the physiological processes in the growth points are also discussed.

963. Cholodny, N. G. 577.16: 581.13
Atmosphere as possible source of vitamins.
C.R. Acad. Sci. U.R.S.S., 1944, **43**: 257-9, bibl. 3.
Arguments are advanced in favour of the hypothesis that some of the volatile organic compounds emanating from plants are absorbed by the cells of the lung tissue where they perform the function of accessory food factors or vitamins. The need is stressed of making a thorough investigation of the phytogenic organic substances of the atmosphere.

964. White, O. E. 581.496
The biology of fasciation and its relation to normal growth.
J. Hered., 1945, **36**: 11-22, bibl. 11.
Numerous diverse internal or external factors operate singly or in combination to produce fasciation. If primarily internal the character is hereditary, giving rise to races that breed true. The hereditary races arise as mutations. Externally-caused fasciations have repeatedly been produced experimentally in a number of different genera. In hereditary forms no alteration of environment will alter fasciation. The article is well illustrated.

965. Seifriz, W. 576.311.38
The structure of protoplasm. II.
Bot. Rev., 1945, **11**: 231-59, bibl. 82.
A review of the literature of the past 10 years.

Growth substances.

966. Avery, G. S., Jr., Berger, J., and White, R. O. 577.15.04
Rapid total extraction of auxin from green plant tissue.
Amer. J. Bot., 1945, **32**: 188-91, bibl. 16.
In the search for a rapid method of total extraction of auxin from green plants, it has been found that green tissue from certain species of *Cruciferae* gives the maximum auxin yield upon autoclaving for 30 minutes in 1 N alkali. In cabbage and kohl-rabi, about 20 to 30% of the total auxin is free, and extractable with water alone; the remaining 70 to 80% is precursor, which is at least partly water-soluble, and convertible to auxin upon alkaline hydrolysis. Green leaf tissue from these plants contains total auxin equivalent to from 0·03 to 0·35 mg. indoleacetic acid per gm. of dry tissue. Hydrolysis of green tissue with 0·5 N acid also gives increased total auxin yields, which in the case of kohl-rabi is equal to that obtained upon alkaline hydrolysis. [Authors' summary.]—Connecticut College.

967. Nutman, P. S., Thornton, H. G., and Quastel, J. H. 577.15.04: 581.14
Inhibition of plant growth by 2: 4 dichlorophenoxyacetic acid and other growth substances.
Nature, 1945, **155**: 498-500, bibl. 3.
The authors, who conducted this investigation at Rothamsted, summarize their chief results in the following manner: The action of 2: 4-dichlorophenoxyacetic acid on the plant varies according to concentration from complete inhibition of germination to a stunting of the root-system and dwarfing of the leaves. This effect on the roots is accompanied by a marked thickening of the cortex and also, in certain cases, by the development of numerous short laterals. Problems of great physiological interest are raised by the fact that these compounds, which are known to stimulate extension growth and to have profound developmental effects, are also toxic to the whole plant in doses of 0·1-1·0 part per million. 2: 4-dichlorophenoxyacetic acid, however, differs from such compounds as β-indolyl- and α-naphthylacetic acids in that it persists long enough in unsterilized soil to produce marked toxic effects. These effects show at a concentration of 1 part per million of soil solution, equivalent to 1 part in 4 millions of soil at 25% moisture, representing on a field-scale about ¼lb. per acre of soil to 6 in. depth. It would thus seem that this compound should be of use in controlling plant-growth. It is not readily leached from soil but yet possesses the advantage of ultimately losing its toxicity; thus it would be unlikely to poison the land. The fact that different types of plants vary greatly in susceptibility to its toxic action may here be of considerable practical importance.

968. Said, H., and Shoushan, A. A. 581.144.2: 577.15.04
Root-formation on cuttings of plants which normally do not root.
Nature, 1945, **155**: 791, bibl. 6.
In *Bougainvillaea spectabilis* var. *lateritia* root formation on 50% of woody cuttings was induced by basal application of 0·015% β-indoleacetic acid solution for a period of 12 hours. Trials with *Mangifera indica* have, so far, not been conclusive.—Fouad I University, Cairo.

969. Krassilnikov, N. A. 577.15.04: 631.46
Phytohormonal activity of soil bacteria.
C.R. Acad. Sci. U.R.S.S., 1944, **45**: 80-3, bibl. 16.
Experiments conducted at the Microbiological Institute of the Academy of Sciences of the U.S.S.R. showed that extracts or filtrates of the cultures of certain soil bacteria grown in synthetic media had a similar stimulating effect on the development of higher plants to that of growth substances. Data are presented for the effect of bacterial metabolites on roots of peas, wheat and maize, on cuttings of lemon, pea and potato, on pine seedlings, on *Lemna* and on several agricultural crops after seed treatment. Strains of the *Pseudomonas* group were found to be richest in growth substances followed by *Azotobacter* and the non-sporulating bacteria of the *Achromobacter* group. Lemon cuttings kept in a bacterial culture for 12-30 hours rooted 2-6 days earlier than the controls. The average yield increase in wheat as a result of seed treatment with bacteria amounted to 15-25%. It is held that the effect is produced by a complex of different substances which are regarded as hormones.

970. Levine, M. 581.14: 547.944.6 + 537.531
Colchicine and X-rays in the treatment of plant and animal overgrowth.
Bot. Rev., 1945, **11**: 145-80, bibl. 140.
Lanoline paste to which colchicine was added killed the overgrowth caused by *Bacterium tumefaciens* in certain plants, though the development of a tumour as a result of inoculation could not be thus prevented.

971. Loo, T.-L., and Tang, Y.-W. 631.531.17
Growth stimulation by manganese sulphate, indole-3-acetic acid, and colchicine in the seed germination and early growth of several cultivated plants.
Amer. J. Bot., 1945, **32**: 106-13, bibl. 47.
Manganese sulphate in a wide range of concentrations accelerates the rate of seed germination and growth of plants, provided the time of treatment (soaking) is not longer than 24 hours. It proved superior to indole-3-acetic acid and colchicine, both of which had untoward after-effects following germination.—National University of Chekiang, Meitan, China.

Noted.

972. Common, R. H. 581.192
(7) **Application of the chemiluminescence test for haematin to plant tissues.**
Nature, 1945, **155**: 604, bibl. 2.

Dantin Cereceda, J. 633/635: 581.9(46)
Catálogo metódico de las plantas cultivadas en España. **(Catalogue of plants cultivated in Spain, arranged systematically.)**
Publ. Minist. Agric., Madrid, 1943, second edition, pp. 187, 5 pesetas.

Garcia Romero, A. 631.531
Cifras medias relativas al peso y volumen de las semillas de las principales plantas cultivadas. **(Tables of average weights and volumes of the seeds of the principal cultivated plants.)**
Publ. Minist. Agric., Madrid, 1942, pp. 24.

Goulden, C. H. 519: 633/635
A uniform method of analysis for square lattice experiments.
Sci. Agric., 1944, **25**: 115-36, bibl. 6.

McNair, J. B. 581.192: 633.85
Plant fats in relation to environment and evolution.
Bot. Rev., 1945, **11**: 1-59, bibl. 120.

Mehring, A. L. 631.84
Fertilizer nitrogen consumption [in the U.S.A.].
Industr. Engng Chem. (industrial edition), 1945, **37**: 289-95, bibl. 24.

Solomon, M. E. 631.432
The use of cobalt salts as indicators of humidity and moisture.
Ann. appl. Biol., 1945, **32**: 75-85, bibl. 18.

TREE FRUITS, DECIDUOUS.

General.

973. Maine Agricultural Experiment Station 634.1/8(741)
Fruits.
Reprint from *Bull. Me agric. Exp. Stat.* **426**, 1944, pp. 314-35, bibl. 7.
This report of recent progress in fruit research obtained at the Maine Agricultural Experiment Station deals mainly with apples and discusses the following subjects: Apple breeding; hardy stocks; autumn fertilization of apple trees and winter injury; orchard soil management; control of apple leaf scorch; reduction of McIntosh drop by hormone spray applications; apple mealybug (*Phenacoccus aceris*); European red mite (*Paratetranychus pilosus*); apple fruit fly (*Rhagoletis pomonella*); apple scab control; storage, transportation and selling; Maine apples under wartime conditions; and delayed orchard thinning. Of the three pages devoted to small fruits two deal with the blueberry fruit fly. Notes on strawberry, raspberry and grape variety tests conclude the report proper. A few abstracts of relevant papers are followed by an appendix containing three pages of tabulated data.

974. Wilson, J. P. 634/635(83)
The California of South America.
Agric. Amer., 1945, **5**: 73-4.
An outline of Chilean horticulture, which has many features in common with that of California, the seasons, however, being reversed. Hence, Chile is in a position to supply U.S. markets with citrus and deciduous fruits, avocados, grapes, raisins, nuts, etc., as well as with many important vegetables during the Californian off-season.

975. Evreinoff, V. A. 634.1/2: 576.1
Notes sur l'origine botanique et génétique de nos arbres fruitiers. **(Notes on the botanic and genetic origin of fruit trees cultivated in Europe. Apples, pears, peaches, plums and cherries.)**
Rev. hort. Paris, 1944, **116**: 11-3, 18-9, 55-6, 69-71, bibl. 45.
The origins of the principal European tree fruits are examined. *Malus sylvestris* Miller and *M. pumila* Miller are considered to be the original parent stock of most European, but not American, apples. *Pyrus communis* L., *P. nivalis* Jaquin and *P. serotina* Rehder are responsible for the pears and *Prunus davidiana* Franchet, *P. persica* Sieb and Zuc. for most of the peaches, *Prunus domestica* L., *P. insititia* L. and *P. cerasifera* Ehrh. for plums and gages, and for the cherry *Prunus cerasus* L. and *P. avium* L. The articles contain much information on sub-species and other matters of interest to breeders.

976. Terry, H. B. 634.1/7(68)
Planting the commercial orchard.
Fmg S. Afr., 1945, **20**: 245-8, 258.
Instructions for the planting of a commercial orchard under South African conditions are given for the benefit of intending growers.

977. Wilcox, J. C. 634.11
Some factors affecting apple yields in the Okanagan Valley. I. Tree size, tree vigour, biennial bearing, and distance of planting.
Sci. Agric., 1944, **25**: 189-213, bibl. 20, being *Contr. Dominion exp. Farms Service* **636**.
The average yield of McIntosh apples, the leading variety in the Okanagan Valley, B.C., is recorded as 456 boxes per acre, i.e. less than half of what can be expected under favourable circumstances. In 1937 an investigation was started to determine the relationships between certain selected factors and tree performance. It is proposed to publish the results of this study in a series of papers. The conclusions presented here are based on statistical analyses of mature McIntosh trees, standing in grower-owned Okanagan Valley orchards in groups of 5 or less, most of them surrounded by other mature McIntosh trees. Records were made of trunk circumference, terminal length, total yield, profitable yield and twig weights (for 2 years only), from which were calculated the annual increase in trunk circumference, the trunk-ground ratio (a measure of tree size per unit of ground space occupied) and the biennial bearing index (a measure of the degree of biennial bearing). Because of the inter-annual differences associated with biennial bearing the factorial effects on average yield were studied from at least two-year averages. The chief results obtained are summarized by the author as follows: "The correlations among the two-or-more-year averages indicated the following trends: (1) The larger the tree, the greater was the total yield and the profitable yield per acre. (2) The longer the terminals, the greater was the total yield but not the profitable yield. (3) The greater the degree of biennial bearing, the less were the total yield and profitable yield. This last effect was the most marked of the three.

Biennial bearing appeared to be more closely associated with meteorological conditions than with lack of tree vigour. The factorial optima determined from the scatter diagrams were as follows: trunk diameter 14 inches or larger (with trees planted 30×30 feet apart on the square), terminal length 25 to 30 cm., and biennial bearing zero (i.e. 100% annual bearing). The average losses of yield resulting from deviations of the three major factors from their optima were much the greatest with biennial bearing. The trees occupying less than 900 square feet per tree produced higher yields per acre, both of total and of profitable fruit, than did those occupying 900 or more square feet. No differences were found among districts that could not be attributed to differences in the three major factors studied." The marked effect of biennial bearing on average yield is, in the author's opinion, the most important finding reported. Extensive tabulated data are presented in an appendix.—Dominion Experimental Station, Summerland, B.C.

Varieties.

978. SIMMONDS, A. 634.11-1.521
The origin of apple Ellison's Orange.
J. roy. hort. Soc., 1945, **70**: 150-1.

Ellison's Orange is the result of a cross between Cox's Orange Pippin and Calville Blanche (probably Summer Calville) at the instance of the Rev. C. C. Ellison (1835-1912) in 1890. It first fruited at old Bracebridge Vicarage, Lincoln, and was first distributed as grafts in 1908 by Messrs. Pennell & Sons. The original tree has disappeared under a housing estate.

979. REIMER, C. 634.11-1.55
Några avkastningssiffror från Cox's Orange.
(Cox's Orange yield figures.)
Fruktodlaren, 1945, No. 1, pp. 15-8.

The yield figures presented for the years 1930-44 relate to 19 Cox's Orange trees at Alnarp, planted in 1915 in squares of 5×5 m. on three Doucin clones and 5 seedlings as rootstocks. At first the orchard was intercropped with mahonia, which had a depressing effect on yield. The statistics are therefore confined to the last 15 years, the normal vigour of the trees having been regained by 1930. At the age of 30 years the biggest dwarf tree on Doucin was 3·5 m. high with a diameter at the top of 4·7 m., whereas the biggest tree on seedling rootstock measured 4 m. and 5·7 m. respectively. Picking took place between 20 September and 30 October, according to weather conditions. The average annual yield per tree on the three Doucin clones amounted to 42·1, 26·1 and 34·7 kg. respectively, while the trees on seedling yielded 44·4 kg. on the average. After the severe winters of 1939-42 most of the trees on Doucin showed symptoms of decline, while the trees on seedlings remained vigorous. From various observations and comparisons, however, it is concluded that the decline is due to senility rather than to frost damage. Finally, the following recommendations are given: (1) Plant apple trees in virgin soil, (2) use a vigorous rootstock for Cox's Orange, (3) avoid perennial cover crops, (4) plant annual cover crops for the first 4 or 5 years.

980. CHARLEY, V. L. S.
634.11 +634.13: 663.3
Varieties of apples and pears for cider and perry making and soft fruits for syrup production.
Vegetable and Fruit Growers' Conferences. Littlebury & Co. Ltd., Worcester, England, 1945, pp. 51-3.

Cider and perry. Dr. Charley lists apples classified as sharps, sweets and bittersweets suitable for growing in Worcester, Gloucester and Hereford for the making of cider. Perry production has decreased very much and the three pear varieties Butt, Oldfield and Holmer should suffice for any planting thought advisable.

Soft fruit syrups. The present known varieties of blackcurrants should suffice, but the growing of more early varieties, particularly Mendip Cross, and late varieties such as Westwick Choice would greatly help the juice manufacturers. Of strawberries Early Cambridge is mentioned as affording good flavour. The best raspberries for well flavoured syrup production are Red Cross, Baumforth A and Improved Beehive.

981. SOUTHWICK, L., FRENCH, A. P., AND ROBERTS, O. C. 634.13-1.52
The identification of pear varieties from non-bearing trees.
Bull. Mass. agric. Exp. Stat. **421**, 1944, pp. 51, bibl. 8.

Massachusetts has already published bulletins on the identification of apples (3), cherries and plums in the nursery stage; this, the sixth in the series, presents a detailed description of nursery pear trees. General remarks on the value of tree and leaf characters in the identification of pears are followed by the vegetative characteristics of 47 pear varieties, 41 of them by photographs.

982. BAILEY, J. S. 634.22
The beach plum in Massachusetts.
Bull. Mass. agric. Exp. Stat. **422**, 1944, pp. 16, bibl. 5.

The fruit of the beach plum, *Prunus maritima*, which grows wild on the coastal plains and sand dunes from Virginia to New Brunswick, is used for jam and jelly making. More recently, the tree has acquired some commercial importance and cultivation trials have been carried out. The well illustrated bulletin reports the results of these experiments and brings together other available information on soil requirements, propagation, pruning, fertilization, pollination and pest and disease control.

983. GRUBB, N. H. 631.521: 634.23 +634.711
Cherry and raspberry varieties.
Vegetable and Fruit Growers' Conferences. Littlebury & Co. Ltd., Worcester, England, 1945, pp. 30-7.

Raspberries. The merits and demerits of Norfolk Giant, Lloyd George and Newburgh are discussed and shorter notes are given of some 12 other varieties. It is noted in addition that 6 of the new East Malling seedlings—as yet unnamed—have now been planted for large-scale propagation. Although they promise well, it is unlikely that any will be equally good for all soils and purposes. *Cherries.* Points to be considered by the would-be planter of cherries are here discussed. They include pollination, time of blossoming, time of ripening, spacing and susceptibility to bacterial canker. A favourable note is made of the two new varieties recently named at Merton, Merton Heart and Merton Bigarreau.

984. CRANE, M. B. 634.22
What are the best plums to grow ?
John Innes Bull. **1**, 1945, pp. 44-50.

The plums grown in England are here divided into cooking and dessert varieties and again into self-compatible and self-incompatible varieties. Their characters are discussed and valued. Most of the cookers are self-compatible, most of the dessert varieties show self- and cross-incompatibility. To ensure adequate pollination of most of the desirable dessert sorts careful provision must be made at planting for effective cross-pollination. There are indications that high nectar varieties—which are specially attractive to bees—should be kept apart from low nectar varieties. Wild bees appear to be better pollenizers of long-pistil, short-stamen varieties than hive bees and they should be encouraged. Plums flower early and should, therefore, be planted on frost-free sites.

985. MASTERS, F. J. 634.22
Plum varieties.
Vegetable and Fruit Growers' Conferences. Littlebury & Co. Ltd., Worcester, England, 1945, pp. 46-50.
Plum growing is of greater importance in parts of Worcestershire than anywhere else in England. In the past the Yellow Egg or Pershore has been the commonly used rootstock, but certain varieties such as Burbank need a more robust stock and on lighter soils the life of the Pershore is accounted too short. The author gives critical details of the more usual and the lesser known plum varieties grown in Worcestershire. In the discussion Mr. Hirst, Director of the Campden Preservation Station, gives evidence on canning qualities, noting incidentally that canned plums are generally labelled as Victoria Plums, Golden Plums, Red Plums, Greengages and Damsons.

986. EVREINOFF, V. A. 634.22
Le prunier japonais (*Prunus salicina* Lindl.). **(The Japanese plum, its origin, varieties and cultivation.)**
Rev. hort. Paris, 1943, **115**: 296-8; 307-10, 323-5, bibl. 30.
Prunus salicina, the Japanese plum, is probably a native of west and south-west China; it is not known wild in Japan. It was first propagated in the U.S.A. by J. Kelsey and fruited for the first time in 1876 in California. Compared with the European garden plums its advantages are: robust habit, early first bearing, early ripening, heavy and regular yields, fruit transports well. Inconveniences are: its early flowering habit renders it subject to frost damage; the stone clings firmly to the flesh; the tree is not so cold-resistant; in unsuitable soils it suffers from disease especially from *Coryneum beijerinckii* and *Monilia cinerea*. Its quality is found to be inferior to that of European plums. Sixty-seven varieties are described here out of the 92 at present cultivated. The author is personally acquainted with 35 of these, 16 of which he considers could be grown in France. These are underlined in the text. The remainder of the paper discusses methods of cultivation. Half standard is the form recommended for the tree, for it resents the hard pruning needed for espalier and similar forms, though it often is so grown.

987. NILSSON, G. 634.1/7-1.521 + 1.537
Våra fruktsortiment ur plantskolesynpunkt. **(Fruit varieties and nurseries.)**
Fruktodlaren, 1945, No. 2, pp. 57-9, 62.
Although the selection of fruit varieties grown in Sweden has undergone considerable changes in the course of time it is interesting to note that the 1865 catalogue of Alnarp nursery contains 7 apple varieties, which figure in the latest list of the Swedish Pomological Society, and 8 out of 13 pear varieties recommended by the Society to-day. Of the plum and cherry varieties mentioned in 1865 hardly any are of importance now. The tendency to cut down the number of fruit varieties in Sweden is reflected in the latest official list which reduces the number of previously listed apple varieties from 42 to 25, pears from 26 to 13, plums from 14 to 9 and cherries from 14 to 8. The Danish variety list has experienced similar cuts. Six tables show the comparative sale of apple and pear varieties as standard and dwarf trees and of plum and cherry varieties from a nursery in central Sweden during the period 1936-43. The figures are discussed in relation to the latest variety list of the Swedish Pomological Society.

Propagation.

988. BLAIR, D. S., AND OTHERS. 634.1/7: 631.541
The budding and grafting of fruit trees.
Chart, Publ. Dep. Agric. Canada, 1944, 1 folded sheet.
The chart presents both a description and a detailed photographic record of budding and grafting techniques. The following operations are illustrated separately by a series of photographs: Root grafting, bridge grafting (with a special chapter on the different slits used), inarching, cleft grafting, bark grafting, oblique side grafting, inverted "L" bark grafting, stub grafting, whip and tongue grafting, shield or "T" budding, Jones (dry and plate) budding, and frameworking.

989. DA SILVEIRA, G. G. 631.541: 634/635
Noções práticas de enxertia. **(Practical budding and grafting.)**
Publ. Serv. Inform. agric. Rio de J. (*S.I.A.*) **36**, 1944, pp. 66.
A number of useful budding and grafting methods are described and illustrated. There are two tables of considerable value for fruit trees and ornamentals respectively, in which notes on suitable stocks, soils, etc., and the best method of budding or grafting are set out for 30 fruits, many tropical, and for a much larger number of ornamentals. The method chiefly advocated is the ordinary cleft graft.

990. THIES, W. H. 631.541.42: 634.1/7
Top grafting fruit trees.
Leafl. Mass. St. Coll. Ext. Serv. **117** (revised), 1943, pp. 12.
This illustrated introduction to top grafting describes three grafting operations, the cleft graft, the inlay graft and the bark graft, including the subsequent attention required.

991. WOODS, J. J., AND HALL, E. R. 634.1/2-1.541.36
Frameworking fruit trees.
Sci. Agric., 1944, **25**: 163-8, bibl. 2.
A paper read before the Canadian Society of Technical Agriculturists at Toronto in June 1944, and revised to include yield data of 1944. The trials, which have been carried out for 9 years, gave highly satisfactory results for the frameworking of the Bosc, Dr. Jules Guyot and Boussock pear varieties with Bartlett scions. Eight mature Boussock trees frameworked in 1942 yielded a crop of the total value of $103.57 in 1943 and 1944 as against $31.56 produced by 8 topworked trees. The results obtained with apples were less conclusive and the benefit derived from the extra cost involved in frameworking has yet to be proved. The limited trials conducted with plums were generally unsuccessful. Possibly, the incompatibility of stock and scion is the limiting factor, since a vigorous state of growth is necessary both for frameworking and topworking. No incompatibility was encountered in pears.—Dominion Experimental Station, Saanichton, B.C.

992. NATIVIDADE, J. V. 634.63-1.532/535
A heterofilia de oliveira do ponto de vista da propagação vegetativa. **(Heterophylly of olive as affecting its vegetative propagation.)** [English summary 2 pp.]
Reprinted from *Agron. lusit.*, 1943, **5**: 147-85, bibl. 58.
Suckers developing from the adventitious buds in the rootbearing mammillae on the trunks of olives present a juvenile external morphology, which can be attributed to the special nutritive and hormonal conditions responsible for the differentiation of adventitious buds and for their ulterior development. In experiments which are described, semi-hardwood cuttings 8-20 cm. long made from suckers at the base of the variety Galega rooted satisfactory (66% and 74%) without growth substance treatment, when set in January in boxes filled with a 3:1 sand and rotted compost medium and kept in unheated greenhouse (in Portugal). Although the appearance of juvenility did not alter, cuttings set at later dates rooted in greatly decreasing percentages as the season advanced. Of those set in May none rooted. This decline is apparently correlated with a decrease in the concentration of carbohydrates as much as of auxins just before and during the greatest physiological activity of the parent plant. Etiolation of cuttings by

covering with soil resulted in maintaining a higher percentage of rooting over a longer period, possibly because, lignification being less advanced, the cells could react more quickly to the root-forming substances. Dormant cuttings responded to treatment with 2% sucrose and with hetero-auxin-lanoline, especially to the former. The material was taken from trees after an off-year since olive cuttings of the hardwood type, and therefore probably of the semi-hardwood type used here, are more difficult to root after an on-year. Hardwood cuttings of the variety Galega from year-old suckers planted in the open rooted poorly. The utilization of semi-hardwood cuttings taken from basal suckers in winter or early spring during the period of least physiological activity, which follows the ripening of the fruits, offers good prospects for large-scale propagation of selected varieties, since Portuguese olives are all from cuttings on their own roots.

Rootstocks.

993. Bligh, R. D. L. 634.11-1.541.11
Our apple trees—can their growth and productiveness be modified ?
Eighty-first A.R. Nova Scotia Fruitgrs' Ass. 1944, 1945, pp. 31-9.

A study of the growth and returns made by Crimson Gravenstein, Cox's Orange and Red Spy worked on Malling stocks II, VI, XVI, I, XII, XIII and IX and planted in 1930 in Nova Scotia and of McIntosh and Fameuse on Malling I, II, IX and XII and on Anis and Beautiful Arcade stocks (Russian stocks introduced into Canada in 1882) planted in 1934. In the first trial the rootstocks were from the stoolbeds at Kentville, originally supplied from East Malling in 1923; in the second the propagation of the nursery trees used was carried out at East Malling and the trees came as 2-year-old nursery trees to Kentville in 1923. In both cases the observed results are tabulated in this report. Salient features of the first trial are as follows:—Malling IX was not a success and only 3 out of the original 27 trees survived in 1944. High winds and heavy rain had uprooted the rest. Of the so-called vigorous types VI, XII, XIII and XVI, VI proved least vigorous and was smaller and less productive than I. Type XII generally showed slightly the most vigour. XIII was somewhat smaller and shorter, but showed an equal spread. XIII came into cropping early and has borne more abundantly than the others. Crimson Gravenstein was the most productive on all the rootstocks except XIII. Cox's Orange was particularly fruitful on XII. Red Spy came into bearing early and bore regularly and heavily, especially on I, XII and XIII. In the second experiment Malling IX made a better showing and 28 out of 32 trees survived. No material difference could be observed in the fruiting habit, i.e. biennial or annual, of any one rootstock or type of rootstock. As regards size and colour of McIntosh, IX developed the larger size, Anis and Beautiful Arcade the better colour; II did much better in this trial and there was little to choose between its behaviour and that of I, though II was inclined to be shallow rooted and had a tendency to blow over. The behaviour of both I and II was, however, inferior as regards size and fruit production to Anis and Beautiful Arcade. The trials do not contradict the view that it is possible to ensure a definite measure of vigour, size and fruitfulness by the use of clonal stocks, nor do they prove that the Malling stocks are superior to selected rootstocks of the Anis or Beautiful Arcade.

994. Roulon, —. 634.11-1.541.11
Sur divers pommiers et porte-greffes cités au dernier Congrès Pomologique. **(Some apples and rootstocks mentioned at a recent pomological conference at Rennes.)**
Rev. hort. Paris, 1944, **116**: 24.

A local apple stock known as Noir de Monton is much used in the district round Clermont-Ferrand and can be obtained from the Services agricoles of Clermont-Ferrand or from local nurserymen. The root system is particularly well furnished. The stems are smooth and grey-black in colour. It layers well. The apple Reinette de Canada, type Auvergne, gives particularly good results on this stock. Addresses are given of official sources from which various apples, such as Reinette de Caux, the true Reinette de Mans and others can be obtained true to name. A local variety from Brittany known as Chailleux, remarkable for its fertility, quality and appearance deserves to be popularized throughout France. The École Nationale d'Agriculture at Rennes has a small amount of budwood of this apple for distribution. Reinette d'Armorique and Grosse Rougette de Dol, though interesting, are best left as local types and not distributed further.

995. Martin-Lecointe. 634.1/7-1.541.11
La sélection des sujets porte-greffes. **(Selection of rootstocks.)**
Rev. hort. Paris, 1943, **115**: 377-8.

The author notes that France has a large variety of fruit tree rootstocks, most of which are identical with East Malling types, and that the French names should be retained on the ground of priority. Recognized clonal stocks are—for apple: Paradis noir de Fontenay=East Malling VIII; Paradis Jaune de Metz=E.M. IX; Doucin de Fontenay=E.M. II; Doucin amelioré=E.M. V. E.M. X, XIII and XVI have no French equivalents. The qualities of the French stocks are described. English equivalents are not given for quinces. The following are recommended for use with pears: Cognassier de Fontenay, propagated by layers; C. d'Angers, by cuttings; C. de Provence, method of propagation not stated. De Vitry, d'Orléans and de Doue are also possibilities, but require clonal selection. Stocks recommended for plums are: Mariana, also good for dwarfing apricots; Myrobolan blanc=Mirabellier des Belges; Damas de Toulouse=Saint Julien de Toulouse, much used in the south-west for peach. For the North and East of France Saint Julien needs selecting and sorting out, for the South different strains of Damas de Toulouse, and Sainte Catherine and Dauphine which sucker freely. These four require selection and definition. The free stocks have value for their vigour and longevity but they require further investigation. To obtain homogeneity types known to be relatively constant from seed should be used, for instance, Sainte-Lucie plums. Among the cherries, seedlings of those with red fruits have most affinity with the guignes and bigarreaux and those with black fruits with sweet cherries and Montmorency types. Myrobalan is reported as fairly constant, St. Julien as excessively heterogeneous and the latter should only be used after individual selection of the seedlings in the nursery, which is now never practised. Free stock from horticultural varieties seldom comes true, but seedlings of the cherries Bigarreau Napoléon and Gros Coeuret are fairly uniform and form good stocks for bigarreaux and guignes. Of the pears Carisi and Saugé and of apples Précoce de Croncels come very true and the apple is fairly resistant to woolly aphis. Research should be vigorously directed to the discovery of reliable parent types for the production of stock seed.

996. Flemion, F., and Waterbury, E. 634.25: 581.14
Further studies with dwarf seedlings of non-after-ripened peach seeds.
Contr. Boyce Thompson Inst., 1945, **13**: 415-22, bibl. 3.

The paper reports the results of studies with peach seedlings dwarfed by germination after removal of seed coats, without the intervention of low temperature stratification. Experiments with grafts show that the dwarfed plants make ample root growth and that the root system will support growth of normal tops, whereas dwarfed tops grafted on normal rootstocks will retain their abnormal character, thus indicating that the seat of dwarfishness is in the top, which makes

poor growth, possibly through some deficiency or because of the presence of an inhibitor.

Pollination.

997. (Butler, C. G.) 634.1/7: 581.162.3
Honey-bee as fruit pollinator and other bees.*
Fruitgrower, 1945, **100**: 7-8.
The author considers that the bees as a group are particularly well suited for pollination. Of them the honey bees are at present most amenable to the wishes and needs of man and are therefore preferable. Other bees such as the bumble bee and the solitary bees including the various species of *Andrena* and *Halictus* may, because of certain of their habits, individually effect a greater measure of cross-pollination than the individual honey bee, but until such time as the problem of establishing the solitary bees in desired areas has been solved the honey bee should still be used.

998. Shaw, F. R., and Bourne, A. I. 638.1: 632.951
Observations on bee repellants.
J. econ. Ent., 1944, **37**: 519-21.
Experiments have been in progress for some years at Massachusetts State College, Amherst, on the value of bee repellants. Creosote seemed to have the best possibilities of the materials tested, with carbolic acid and a proprietary phenol compound known as Milkol second, though the value of all three is still questionable. The addition of creosote to the spray mixture invariably produced blossom injury, though in the experiment discussed it was not sufficient to cause an important decrease in fruit production. The addition of lime reduced foliage injury caused by the creosote

Cultural Practice.

999. Maclean, G. A. 634.11
Intensive apple production. New system.
Fruitgrower, 1945, **99**: 233.
The system described† is claimed by the author, who has begun to practise it, as superior in some ways to the cordon and dwarf pyramid systems. He provisionally names it the " column with laterals system ". The maiden is pruned after planting to knee height to form a strong self-supporting central stem by annual pruning of the leading shoot till the height of 8 ft. is reached. Laterals radiate out at regular intervals from bottom to top, being unpruned maiden laterals and 2-year fruiting laterals with the extension growth nipped off. A specified number of maiden laterals are retained each year and the 2-year laterals, after fruiting, are cut back to ½ inch of the main stem so that the process of forming further maiden laterals can continue from the same point. The required height is reached in six years. A Cox of this height could carry at least 12 laterals of each type, but the number varies with the individual and the variety. Laterals, which should be evenly distributed, can be made to start where desired by notching above the buds selected to produce them. Laterals at the top of the main stem should not be selected immediately below the new extension growth, but from the small and weaker ones which arise on the main stem at a less acute angle. These are the more fruitful. Those maiden laterals which are cut should be left with at least ½ inch to serve as a point of origin for further lateral growth. A few fruit spurs forming on the main stem may be left. The advantages claimed are: (*a*) only uncomplicated winter pruning is required and can be done at leisure; (*b*) the tree remains permanently young; (*c*) it is (so far) the complete answer to biennial bearing; (*d*) there is little June drop. A vigorous stock with subsequent grassing down is suggested rather than a dwarfing stock, in order to ensure both good lateral growth and heavy cropping. In certain varieties, Worcester and Lord Lambourne for instance, the terminal bud of the lateral must be pinched out or blossom buds will not form regularly on the remainder of the lateral. The leader shoot, on reaching the desired height, is pruned hard back to the base of its extension growth during May. This discourages vigorous growth at the top and distributes the sap over the entire length of the stem. Planting distance suggested is 9 × 4 ft.

* Notes on paper, The behaviour of bees when foraging, *J. roy. Soc. Arts*, 1945, 93; 501-11.

† For a fuller account see Thompson's *Modern Apple Tree Pruning* or Seabrook's *Modern Fruit Growing*.

1000. Belot, A. 634.1/7-1.546
Les arbres fruitiers en cordons horizontaux. **(Horizontal cordons.)**
Rev. hort. Paris, 1944, **116**: 86-90, 111-4, bibl. 3.
The training of several types of horizontal cordon fruit trees is fully described and illustrated. Apples, pears, peaches and vines are the fruits considered.

1001. Fournier, P. 631.542: 634.1/8
La taille *Lorette* avant *L. Lorette*. **(The Lorette system of pruning before the days of L. Lorette.)**
Rev. hort. Paris, 1943, **115**: 313-5, bibl. 2.
It is contended that the Lorette system of pruning first published by L. Lorette in *Jardinage*, 1912, was anticipated by J. Desbois who began experimenting in 1879 and of whose book, *Nouveau mode de culture appliquée à la vigne et aux arbres fruitiers*, a third edition was issued in 1911. The principle of each system is to develop fruiting spurs by the suppression of the young shoots during the growing season and in the technique of each there is fairly complete agreement.

1002. Boynton, D. 634.11-1.8
Recent advances in orchard fertilization practices.
Proc. N. York St. hort. Soc. 90th annu. Meet. 1945, pp. 67-71.
Uramon, an organic nitrogenous fertilizer applied in one of the regular summer sprays, offers promise for appropriate application of nitrogen so as to produce a quick effect of short duration. Potash manuring of young trees in New York orchards appears desirable in the 2nd to 5th years to prevent set-backs by leaf scorch. The deficiency can be determined by leaf analysis. Magnesium deficiency was first noted in a McIntosh orchard in 1941. There are indications that dolomitic limestone used separately or in addition to Epsom salts may alleviate or eliminate the condition, but the problem is not a simple one and needs further study.

1003. Glaenzer, B. 634.1/7-1.8
Technique de fertilisation des arbres fruitiers au pal injecteur. **(The technique of applying artificial manures to fruit trees by means of soil injection.)**
Rev. hort. Paris, 1943, **115**: 272-3, bibl. 2.
The soil injector, or fertilizer lance, is described and photographically illustrated. The charge is automatically regulated by pressure so that only a pre-arranged amount of nutrient fluid can pass at each insertion in the soil. The kind and quantity of artificial to use is of great importance and beyond a brief general statement no attempt is made to discuss it. The number of injections per tree depends on size. An orchard standard tree of average size would be surrounded by a ring of 8 holes at the perimeter of the branches. Roughly 8 injections of 250 c.c. would convey 400 g. of a complete manure diluted to 20%. Deficiency treatments can also be applied in this way. A change for the better can be observed in the foliage within a month. Among results claimed are the total suppression of summer fruit drop, increased yield and sometimes elimination of biennial bearing.

1004. Ross, W. H., and others. 631.842.4
Preparation of ammonium nitrate for fertilizer use.
Industr. Engng Chem. (*industrial edition*), 1944, **36**: 1088-95, bibl. 12.

Extensive trials by the U.S. Department of Agriculture, Beltsville, Md, showed that caking of ammonium nitrate in storage is prevented by granulating the product to give particles of 8-16 mesh, drying to a moisture content of 0·2% or less, treating with 3-4% of a conditioning agent, e.g. kaolin or other types of clay and various types of kieselguhr (the most effective material, namely tricalcium phosphate, not being available at present) and storing in moisture-proof bags. Such bags are on the market now.

1005. Harper, R. S. 631.67: 634.1/7
A message to irrigators. Problems at Cobram.
J. Dep. Agric. Vict., 1945, **43**: 65-73, bibl. 3.

The reduction in permeability and consequent deterioration of soils due to mistakes in irrigation practices has forced growers in the Goulburn Valley to abandon citrus in favour of peaches, peaches in favour of pears and in many cases pears in favour of pasture. These regrettable changes in soil texture are the result of clay particles being washed from the surface to lower layers where they accumulate and form a tight layer. It is the object of this article to show growers in the newly-opened irrigation district around Cobram, where canning peaches do excellently at present, how to avoid a deterioration of the large areas of friable open soil by discussing the results of a few soakage-rate determinations made on two types of Cobram loam soils. The " Spot Soakage " apparatus, which utilizes the principle of directly measuring the water from a small enclosed area, is described and the penetration profiles of irrigated and non-irrigated plots are illustrated by diagrams. Although of a preliminary nature, the tests have given sufficiently clear results to warrant the following recommendations: (1) A run length of 4-5 chains and a slope of 1½-3 in. per chain should be suitable for most soils (2-3 chains on Cobram sandy loam and slopes greater than 6 in. per chain). (2) Make frequent use of the soil auger to avoid any excess watering beyond the minimum required to moisten the root zone. (3) Confine cultivation to the minimum and do not destroy the soil structure by working the ground too soon after irrigation. (4) Maintain a high level of organic matter in the soil, and thereby keep the surface layer in a porous condition, by growing winter cover crops and, perhaps, allowing summer weeds to grow. (5) Irrigated annual crops including pasture and lucerne should be grown in a rotation. (6) Make your own choice between the multiple furrow, the contour check and the border check systems of irrigation.—Horticultural Research Station, Tatura, Victoria.

Noted.

1006. Algeria.
(5) 351.823.1(65): 631.531: 634.1/8
La production des semences et des plantes de vigne et d'arbres fruitiers en Algérie. Reglementation. **(Regulations on the production of seeds and of vines and fruit trees in Algeria issued from September 1938 to July 1942.)**
Bull. Inspect. gén. Agric. algér. **83**, 1943, pp. 79.

Lammerts, W. E. 634.25-1.523
The breeding of ornamental edible peaches for mild climates. I. Inheritance of tree and flower characters.
Amer. J. Bot., 1945, **32**: 53-61, bibl. 10.

Ministerio de Agricultura (Madrid). 634.1/7-1.537(46)
Lista de establecimientos de horticultura, jardineria y arboricultura. **(List of nursery firms in Spain conforming to the conditions laid down by the Bern Phylloxera Convention.)**
Publ. Minist. Agric. Madrid, 1942, pp. 16.

Norbury, C. P. 634.11 +634.13
Apple and pear varieties.
Vegetable and Fruit Growers' Conferences. Littlebury & Co. Ltd., Worcester, England, 1945, pp. 43-5.
Personal choice for conditions near Malvern.

Osmond, D. A. 634.11-1.4
Soils suitable for fruit growing [in Worcestershire].
Vegetable and Fruit Growers' Conferences. Littlebury & Co. Ltd., Worcester, England, 1945, pp. 57-60.

SMALL FRUITS, VINES AND NUTS.

1007. Slate, G. H. 634.7
What's new in small fruit culture ?
Proc. N. York St. hort. Soc. 90th annu. Meet. 1945, pp. 85-93.

Tests in several States suggest that strawberry beds might well be allowed to fruit more than 1 year. With most varieties the spacing of strawberries at 8 inches between plants gave better results than leaving unspaced. Trials have now exploded the idea that manuring is toxic to blueberries. The optimum pH for blueberry soils ranges from 4·4 to 5·1. Methods of acidifying the soil are discussed. Mulching with sawdust has proved successful, but such treatment also makes nitrogenous manuring necessary. Pruning trials on blueberries are also reported. Notes are given of new varieties of strawberry, red raspberry, red currant, blueberry, blackberry and grape.

1008. Strong, W. J., Thompson, R. W., and Howitt, J. E. 634.711 +634.713(713)
The raspberry and blackberry in Ontario.
Bull. Ontario Dep. Agric. **355**, revised 1942, pp. 35.

The cultivation in Ontario of the red raspberry, which is second in importance only to the strawberry, of the black raspberry and of the blackberry are described in detail and production figures are given. The information presented extends to such subjects as types and varieties, location and site, plantation renewal and marketing. Pests and diseases are dealt with by R. W. Thompson and J. E. Howitt, respectively.

1009. Turnbull, J. 634.723 +634.75
Blackcurrant and strawberry varieties.
Vegetable and Fruit Growers' Conferences. Littlebury & Co. Ltd., Worcester, England, 1945, pp. 38-42.

Salient points in the cultivation of blackcurrants and of strawberries are considered and notes are given on noticeable characters of the following varieties:—*currants*: Baldwin, XXX, Seabrooks, Goliath or Esau, Boskoop, Westwick Choice, Daniel's September, Mendip Cross, Davison's 8, Westwick Triumph, and *strawberries*: Huxley, Royal Sovereign, Madame Lefebvre, Tardive de Leopold, Sir Joseph Paxton, Perle de Prague, Western Queen, Early Cambridge and Pillnitz.

1010. Chandler, F. B. 634.736
Low-bush blueberries.
Bull. Me agric. Exp. Stat. **423**, 1943, pp. 103-31, bibl. 19.

The annual production of low-bush blueberries (*Vaccinium angustifolium*) in Maine exceeds that of all other American States and amounts to over one million quarts. The bulletin presents the available information on blueberry

growing in the State, describing the cultural operations from month to month from September to August. In some instances a few technical data are included which have not been published elsewhere. The final chapters deal with costs, other agricultural enterprises and miscellaneous data in alphabetical order.

1011. STRONG, W. J., THOMPSON, R. W., AND HOWITT, J. E. 634.75(713)
The strawberry in Ontario.
Bull. Ontario Dep. Agric. **335**, revised 1942, pp. 22.
A presentation of all aspects of commercial strawberry growing in Ontario including marketing. In 1940, 5,700 acres of strawberries yielded about 11 million quarts, the average yield over a period of years being 1,700 quarts per acre, while 5,000-7,000 quarts are regarded as a good crop. The more important strawberry pests and diseases and their control are discussed by R. W. Thompson and J. E. Howitt respectively.

1012. ROGERS, W. S. 634.75: 351.823.1
Strawberry runner supplies and certificates.
Fruitgrower, 1945, **99**: 430, 434.
Under the Strawberry Nuclear Stocks Scheme the East Malling Research Station supervised the large-scale raising of tested clonal stocks of Royal Sovereign, Huxley and Oberschlesien, and sent out more than 6,000,000 plants in 3 years. This scheme ended in the spring of 1945 and the continuance of the raising of tested stocks under essentially similar cultural conditions is now in the hands of the growers. Special stocks certificates will be given to plants of the highest standard, only the tested pedigree stocks, Royal Sovereign M40, Huxley M44 and Oberschlesien M42 being accepted as parents. Runner beds must be isolated at least 1 mile from other commercial beds, the plants must be raised by the isolated block system [for which see A.R. East Malling Res. Stat. for 1943 pp, 87-94] and the most stringent pest and disease control measures, including roguing, are expected as in the previous scheme. A list of growers who have entered their stocks for the new certificate can now be got from the Ministry, though the actual certificates will not be issued till after the final inspection in September. It is suggested that the most appropriate use of these stocks would be for further propagation. In addition the Ministry's ordinary certificate is still available for plants raised under conditions which, although not nearly so strict, do ensure the maintenance of a reasonable commercial standard. This certificate is normally issued after an autumn inspection at which plants have to be found 99·5% true to type and substantially free from visible noxious diseases and pests and are being grown at least 20 yards from any other stock obviously affected with diseases or pests.

1013. POWERS, L. 634.75-1.523
Strawberry breeding studies involving crosses between the cultivated varieties (×*Fragaria ananassa*) and the native Rocky Mountain strawberry (*F. ovalis*).
J. agric. Res., 1945, **70**: 95-122, bibl. 16.
The immediate object of the breeding programme is to combine the large size of fruit of the commercial varieties with the winter hardiness of the native Rocky Mountain strawberry. Seventy-four promising selections have been obtained so far.

1014. CHOUARD, P. (LESOURD, F.) 634.75-1.544
Les données récentes sur le rôle de la lumière dans le forçage du fraisier. **(Recent data on the part played by light in strawberry forcing.)**
Rev. hort. Paris, 1943, **115**: 396.
An extract from the new revised edition of Lesourd's *Le fraisier* (1943 ?). The revision which brings the work fully up to date was carried out by Simmen, Dubois and Chouard. It is almost impossible to force strawberries into fruit as early as December to February, once the plants have been allowed to begin their winter dormancy in mid-October without an intervening period of cold of such length as to eliminate any chance of producing the fruit in time. However, if the day length is prolonged from before 1 October and the temperature is not allowed to fall, the plants will continue to fruit and bloom without stopping. A comparatively low illumination of 20 foot-candles ("lux") from an incandescent lamp for 6 to 8 hours is sufficient at first, the plant being completely insensitive to illumination lower than this. As the winter days shorten a stronger light is required, such as a 500 foot candle Neon light, which not only provides some warmth but also assists photosynthesis to the extent that well formed ripe fruits are produced. A normal summer temperature and humidity must be maintained. Even in later forcing crops additional artificial illumination will prove useful. The ever-bearing type of strawberry such as Record initiates its floral parts at much shorter intervals of time than the usual type and requires less illumination. These strawberries flower almost continuously on the parent-plant and on the runners and are only deterred by cold. Properly managed, either by forcing or retarding, this type could provide an all the year round supply of fruit.

1015. KARABIHN, N. 634.8
Vineyards on the Don. [Russian.]
Socialističeskoe Zemledelie (Socialist Agriculture), 1944, No. 114, p. 2.
This short communication furnishes some details of reconstruction work, already accomplished or planned for the future, in the Don districts devastated by the Germans. The vineyards are to be restored to their pre-war productivity within the next 2-3 years. More than 350,000 seedlings will be required for the purpose. In two districts alone 5,400 ha. of new vineyards are to be planted. On many collective farms new nurseries have been founded which will produce several million seedlings each year. Local machine tractor stations have been so reorganized as to provide machinery and equipment for viticulture.

1016. GARCIA DE LOS SALMONES, N. 634.8
Como se planta ahora una viña. **(How to plant a modern vineyard.)**
Publ. Minist. Agric. Madrid, 1942, pp. 18.
Modern methods in vineyard planting and care are outlined. Notes on the choice of rootstocks are provided.

1017. AIKMAN, J. M., AND LOUNSBERRY, C. C. 634.51
A basin method of nut tree culture.
Reprinted from *Proc. Ia Acad. Sci.*, 1943, **50**: 241-6.
It was found at the Floris Field Station of the Iowa Co-operative Hill culture project that the so-called basin method was suitable for establishing grafted walnut trees on moderate to steep eroded slopes. Each basin was made at right angles to the slope by scalping the sod and using it to sod the lower rim built up with the soil from the basin area. The size of each basin, which was slightly more than a half-circle in shape, was about 6 feet long by 3½ feet wide and 8-10 inches deep, none of them being deeper than a foot. Trees grown in this manner appeared to be more precocious than those cultivated on the flood plain; some bore 4-5 mature fruits in the third and more than a dozen fruits in the fourth year. The chief advantage of the basin method over the ploughed contour strip is that limited areas may be utilized for nut production. The necessity of a vegetative cover on steep eroded soils is emphasized.

1018. DE TORREJÓN Y BONETA, A. 631.411
Cultivos en arenas. Navazos y vides. **(Cultivating market gardens and vines on sand.)**
Publ. Minist. Agric. Madrid, 1941, pp. 48.
Instructions for the cultivation of the waste sand lands in Spain.

PLANT PROTECTION OF DECIDUOUS FRUITS.

1019. KELSALL, A., AND HILTON, R. J. 634.1/7(716)
Seasonal notes on horticultural projects from the Dominion Experimental Station, Kentville, N.S.
Eighty-first A.R. Nova Scotia Fruitgrs' Ass. 1944, 1945, pp. 39-46.

Boron deficiency. General notes on the boron problem and in particular on spraying and soil treatment in apple orchards showing boron deficiency. There is evidence that an efficient spray treatment is afforded by the addition to the pre-pink bud stage of the bordeaux spray of 2½ lb. borax per 100 gallons. The spray treatment cannot, however, be relied on to remedy the deficiency over a period of years. Soil applications of 20 to 30 lb. per acre to land fully occupied by trees have proved successful. *Preharvest sprays* with plant hormones were tested. Fairly satisfactory results were achieved on Gravenstein and McIntosh by a number of proprietary products, some of them from England. *Frameworking.* The very quick returns from apple frameworking justified the nine times greater amount of labour required as against ordinary topworking. *Thinning apples with caustic sprays.* Various effects of Elgetol are noted.

1020. ADAM, W. B., AND DICKINSON, D. 634.22-2.19: 546.27
Fruit gumming of Victoria plums. Progress report V.
A.R. Campden Fruit Vegetable Pres. Res. Sta. 1944, 1945, pp. 12-9, bibl. 6.

Previous work (see *H.A.*, 13: 1257) has shown that frequency of gumming in Victoria plums is positively correlated with rainfall during the later stages of ripening. However, watering trials to confirm this proved unsuccessful. A significant correlation between gumming and boron content of the leaves of one lot of plum trees supported the previous observation that boron reduces the frequency and size of gum spots. Trials to test the effect of artificials on availability and uptake of boron and on frequency of gumming have so far given negative results, but are being continued.

1021. THOMAS, L. A. 634.11-2.19: 546.27
Stock and scion investigations. IV. Apple measles.
J. Coun. sci. industr. Res. Aust., 1944, **17**: 221-4, bibl. 3.

The more important symptoms of apple measles occurring on young Jonathan and Delicious apple trees and Williams pear trees at the Council's Field Station, Stanthorpe, Queensland, consisted of small patches of purple-brown or bronze colour on the bark of the shoots, raised pimples (about $\frac{1}{16}$ in. diameter), around which the bark dies and cracks, dieback of terminal growths in late summer or autumn and early defoliation. With both apple varieties the fruits also showed certain symptoms. In general, symptom expression was found to vary with climatic and soil conditions. The disorder was treated by incorporating borax solution in the calyx and first cover sprays (at the rate of 1 lb. and 5 lb. per 100 gal.) for 3 years. In most cases a complete cure was achieved after treatment for 2 years, while one year's treatment gave considerable improvement.

1022. ANON. 634.1/8-2.111
The problem of rapid reconstruction of horticulture and small bush fruit plantations. [Russian.]
Vestnik Acad. Sci. of the U.S.S.R., 1944, No. 7-8, pp. 93-6.

This is an account of a conference held in Moscow in April, 1944. The following papers were read at the ocnference: (1) N. A. Maximov, "Activation of growth and development in trees"; (2) I. I. Tumanov, "Physiology of winter-hardiness of fruit plants"; (3) I. V. Belohonov, "The present state of horticulture and the problems of its reconstruction and further development"; (4) G. K. Karpot, "On the agronomical measures pertaining to the restoration of orchards damaged by frost"; (5) N. G. Zuckov, "On the methods of creation of frost resistant orchards"; (6) V. A. Odincov, "Planting material as the basis of creating winterhardy orchards"; (7) A. V. Petrov, "The behaviour of varieties during the severe winters of the 1939-42 period and the standard varieties for the central belt of the Soviet Union"; and (8) V. F. Smirnov, "Dwarf horticulture in the Moscow Province".

1023. MEADER, E. M., DAVIDSON, O. W., AND BLAKE, M. A. 634.25-2.111
A method for determining the relative cold hardiness of dormant peach fruit buds.
J. agric. Res., 1945, **70**: 283-302, bibl. 36.

Winter conditions as they occur in nature were simulated by simple adaptations of an electrically operated ice cream cabinet-type refrigerator, which are described in detail and illustrated. Weighted test tubes containing the peach twigs to be tested were put in an upright floating position into a bath of antifreeze solution (50% ethyl alcohol). The equipment allowed of a cooling to subzero temperatures at an average rate of 2-3° F. per hour, as many as 50 samples being frozen at a time. The method was evolved for the purpose of evaluating the cold hardiness of newly introduced peach varieties and promising peach seedlings, relative to Elberta, which served as a standard. However, it is suggested that more than one variety should be used for comparison in each test. The temperature was lowered to a level at which 1-15% of the Elberta buds remained alive. The samples—unbranched terminal twigs, about 12 in. in length and with an optimum number of buds—were selected from the periphery of the tree. Two or more repetitions of the cold hardiness test during the dormant season are recommended for each variety. The data presented show, among other things, that within the critical temperature range a drop of 1° F. caused a significant increase in injury and that under prolonged slow rates of cooling the buds tolerated considerably lower temperatures than under orchard conditions.—New Jersey Agricultural Experiment Station.

1024. CRANE, M. B. 634.11-2.8
What is wrong with Lord Lambourne ?
John Innes Bull. **1**, 1945, pp. 51-3, bibl. 2.

Observations on the various curious phenomena observed in Lord Lambourne trees including many topworked trees lead the author to the following conclusions:—The so-called rubbery growth and chat fruit abnormalities of the apple Lord Lambourne appear to be of the nature of viruses and to have originated by grafting. It is probable that they can be perpetuated and transmitted by grafting, and possibly only by grafting. They are likely to originate anew by grafting. Following the top-grafting of Lambourne onto established varieties and the bringing together of three individuals, the frequency of the abnormalities is high. Therefore, pending further investigations, it would be wise not to use Lambourne for top-grafting. When propagating Lambourne direct onto rootstocks, or indeed for any purpose, care should be taken that buds or scions are taken from healthy normal trees. Until more is precisely known, it would be a wise precaution to withhold the budding or grafting of Lord Lambourne onto Malling No. XII rootstock, and to use Nos. I and II.

1025. MILBRATH, J. A., AND ZELLER, S. M. 634.2-2.8
Latent viruses in stone fruit.
Science, 1945, **101**: 114-5.

Latent or hidden virus complexes of cherry are usually exposed by budding on peach which, however, does not always react. At Oregon Agricultural Experiment Station the Kwanzan and Shirofugen varieties of *Prunus serrulata*

have proved themselves a much more reliable testing medium for these viruses. When sweet or sour cherry buds having a latent virus complex are budded into these flowering cherries the reaction which follows is always severe. The symptoms are fully described. In all cases, except one tree of Bing and one of Black Tartarian, buds from several different trees of several popular varieties have always given positive tests. A much more extensive test is in progress to see if these two trees of Bing and Black Tartarian are entirely virus-free. It is hoped by means of these tests to discover one virus-free tree of each of the standard commercial varieties to serve as a foundation for future nursery stock.

1026. DANIELS, L. B. 634.25-2.8
The peach mosaic disease.
Science, 1945, **101**: 87-8.

Myzus persicae, the green peach aphid, has been shown to be a vector of peach mosaic at the Colorado Agricultural Experiment Station, Fort Collins. A brief outline is given of the work leading up to this conclusion.

1027. DATTA, S. C. 631.847: 632.953
On the bacteriophage of root nodule organisms.
Ind. J. agric. Sci., 1944, **14**: 272-6, bibl. 4.

Bacteriophage was found in the root nodules of a number of leguminous species examined, when the plants had been in the same soil for a number of years. Certain manures were found to favour its production. Viability and specificity of bacteriophage were also studied in this investigation which was conducted at the Imperial Agricultural Research Institute, New Delhi.

1028. LUCAS, E. H., AND LEWIS, R. W. 632.953: 581.192
Antibacterial substances in organs of higher plants.
Science, 1944, **100**: 597-9, bibl. 10.

A preliminary report of a search that has demonstrated that some higher plants contain antibacterial principles at certain stages of their development. The results seem to indicate a wide field for exploration. The problems will be of a general biological nature rather than confined to the interrelations between bacteria and higher plants.

1029. PERLBERGER, J. 632.42: 634.11 + 634.13
The occurrence of apple and pear scab in Palestine in relation to weather conditions.
Palestine J. Bot. (R), 1944, **4**: 157-61, bibl. 2.

In Palestine, only the local apple and pear varieties have been subject to scab attack caused by *Fusicladium dendriticum* and *F. pirinum*, while the introduced European varieties of these fruits growing on the same plots, remained healthy. The freedom from scab in European apples and pears is not due to disease resistance, but to their beginning their yearly growth 4-6 and 2-3 weeks respectively later than the local varieties, i.e. at a time when the rains have ceased, the temperature is higher and the atmospheric humidity low.—Agricultural Research Station, Rehovot.

1030. COOLEY, J. S. 634.11-2.4-1.8
The effect of manure and of commercial fertilizer on susceptibility of young apple trees to black root rot (*Xylaria mali*).
Phytopathology, 1945, **35**: 207-9.

In an experiment that ran for 7 years of consecutive inoculations with *Xylaria mali*, black root rot, at the Plant Industry Station, Beltsville, Md, yard manure applied annually at the rate of 14 tons per acre did not affect the incidence of the disease. No test was made of the advance or persistence of the disease on bearing trees of high and of low vigour. Seven artificial fertilizer combinations were used, the rates of application of particular fertilizers per acre being muriate of potash 107 lb., acid phosphate (16%) 107 lb., nitrate of soda 324 lb. In none of the fertilizer treatments did the percentage of infected trees differ greatly from that in the check plot.

1031. DELOUSTAL, J. 634.11-2.42
Essais de traitement du chancre du pommier par le sulfate d'oxyquinoléine. (Hydroxyquinoline sulphate as a cure for canker in apples.)
Rev. hort. Paris, 1943, **115**: 252-3.

Hydroxyquinoline sulphate was used as a paste in treatment of apple tree canker at the École Nationale d'Agriculture, Rennes, in 1942. The canker lesions were first excised and the wounds covered with the paste in the form of a manufactured product known as Quino-Chancre. The operation took place in February and by November callusing had made good progress. The cankers treated should not be more than 3 or 4 years old.

1032. WORMALD, H., AND MOORE, M. H. 634.11-2.4
Control of brown rot of apples in commercial orchards.
Fruitgrower, 1945, **99**: 450.

The authors note that two of the varieties used to ensure pollination of Cox's Orange Pippin, namely James Grieve and Laxton's Superb, are extremely susceptible to brown rot (*Sclerotinia fructigena*) infection. They suggest that attention to the following points may help to check brown rot:—(1) Thorough destruction by burning or deep burial of all over-wintering sources of infection such as mummied fruits, infected spurs, (2) thorough attention to control measures against scab, sawfly and codlin, (3) destruction of wasps' nests, (4) adequate bird scaring where birds tend to peck the fruit, (5) application of similar measures to adjacent plum trees, (6) no storage of fruit bruised, injured or picked without stalk, (7) elimination of neglected orchards.

1033. BAIN, H. F., AND DEMAREE, J. B. 634.75-2.411
Red stele root disease of the strawberry caused by *Phytophthora fragariae*.
J. agric. Res., 1945, **70**: 11-30, bibl. 26.

The morphology and physiology of *Phytophthora fragariae* were studied in detail. While it could be shown that the fungus has no hosts outside the genus *Fragaria*, horticultural varieties were found to be susceptible in different degrees. The only control measures suggested are the growing of resistant varieties and certain sanitary measures, such as keeping contaminated fields free from strawberries for at least 3 or 4 years. The distribution of the fungus in the United States is recorded.

1034. WESTON, W. A. R. D. 632.47
Silver leaf disease.
Agriculture, 1945, **52**: 176-8.

A short description of the development of the silver leaf disease, caused by *Stereum purpureum*, and of the conditions favouring the spread of infection, accompanied by a chart. The need for orchard hygiene is emphasized.

1035. REICHERT, I., AND OTHERS. 634.8-2.4
Trials for the control of grape vine diseases: 1. Control of downy mildew (*Plasmopora viticola*). 2. Control of powdery mildew (*Oidium tuckeri*).
Bull. agric. Res. Stat. Jewish Agency, Palestine, **35**, 1944, pp. 12, bibl. 10.

The bulletin is an abbreviated translation from the Hebrew and reports the results of experiments carried out at Mikve Israel, in the central coastal plain of Palestine, during 1939-42. (1) The study of *Plasmopora viticola* on the grape vine varieties Muscat d'Hambourg and Dattier de Beyrouth showed that of all the sprays tested a 1·5% bordeaux mixture and the cuprous oxide spray Perenox at 0·5% gave the most satisfactory control. It has so far not been possible to determine the best dates for the applications, which, as was found, are not correlated with the length of the shoots, but a 3 weeks' interval proved inadequate in seasons characterized by an early downy mildew attack. The copper treatment was found to have the additional effect of delaying

leaf fall and reducing harmful autumn sprouting. (2) Also under Palestinian conditions sulphur dusts proved highly effective when tested against *Oidium tuckeri* on the Carignane vine, Gaza sulphur of the Extra Fine and Superfine brands being as successful as flowers of sulphur. An admixture of lime at the rate of 3 kg. lime to 7 kg. sulphur was found to reduce the cost of the treatment without affecting its efficacy. Two applications are recommended, the first during the last third of April, the second about a fortnight later. A similar measure of control as with dusting was achieved with the lime-sulphur spray Sulfinette or (slightly less effective) with an ammonium polysulphide spray at 1%.

1036. ALDEBERT, P. 634.8-2.411
La lutte contre le mildiou. **(Control of mildew *(Peronospora)* in vines.)**
Bull. Inspect. gén. Agric. algér. **39,** 1941, pp. 11.
Various spray formulae are given including two which economize in copper and are said to be effective good stickers and non-burning.

1037. ANON. 634.8-2.4
Protection du vignoble contre les attaques du mildiou et d'*Oidium*. **(Control of mildew and *Oidium* of vine.)**
Bull. Inspect. gén. Agric. algér. **85,** 1942, pp. 8.
Mildew of vines in Algeria can be controlled by bordeaux mixture if applied in the early stages of the disease. The most critical periods are the first fortnight in May when vegetation and flowering are developing rapidly and in mid-June when the fruit is setting. Against *Oidium* sulphur dusts and sulphur sprays are applied when the attack is developing. Permanganate of potash has a transitory effect against *Oidium*: it will not control subsequent attacks. A wartime deficiency in sulphur and copper is noted and a scheme devised for coping with it.

1038. RAHMAN, K. A. 632.6/7: 634.1/7
Insect pests of fruit trees.
Ind. Fmg, 1944, **5**: 463-6.
The results of a 3-years' survey in the Punjab and the North-West Frontier Province are summarized, special reference being made to distribution, spreading and hosts of the San José scale. A number of other fruit pests as well as quarantine measures, examination of imported fruits and examination and fumigation of imported plants are also discussed. A comprehensive bulletin by the author on insect pests of fruits in N.W. India is promised.

1039. RUIZ CASTRO, A. 632.753
Los pulgones. **(Plant aphids.)**
Publ. Minist. Agric. Madrid, 1941, pp. 90.
An illustrated account of the most troublesome aphids of Spain, their parasites and control.

1040. MICHELBACHER, A. E., AND BORDEN, A. D. 632.753: 632.96
Two introduced insects attacking the woolly aphid in California.
J. econ. Ent., 1944, **37**: 715-7, bibl. 2.
Exochomus quadripustulatus, a ladybird beetle, and *Aphelinus mali*.

1041. STACKELBERG, A. A. 632.752: 632.96
Turanodinia coccidarum* gen. sp. nov. *(Diptera Odiniidae.)*, a new predator of *Pseudococcus comstocki* Kuw. *(Homoptera, Coccodae).
C.R. Acad. Sci. U.R.S.S., 1944, **44**: 126-7.
A technical description is given of the new predator of *Pseudococcus comstocki* which was discovered at the Plant Protection Station in Tashkent.

1042. LEWIS, D. 632.654.2: 634.1/7
How shall we defeat red spider on fruit trees ?
John Innes Bull. **1,** 1945, pp. 54-7, bibl. 7.
Notes mainly on the possibility of breeding varieties of apple resistant to red spider (*Oligonychus ulmi*).

1043. REDMOND, G. 634.11-2.76
Apple blossom weevil. [Letter to editor.]
Fruitgrower, 1945, **99**: 421.
The writer reports that the placing of a collar of freshly burned lime round the necks of matured apple trees on 40 acres in County Armagh gave very good results against apple blossom weevil the first year. The second year the crop of bloom was very heavy and not a single capped blossom could be found in the orchards.

1044. DOHANIAN, S. M. 634.54-2.78 +2.76
Control of the filbert worm and filbert weevil by orchard sanitation.
J. econ. Ent., 1944, **37**: 764-6, bibl. 2.
The significance of picking up preharvest drops in filbert orchards for the control of filbert worm, *Melissopus latiferreanus* and certain weevils, chiefly *Curculio uniformis*, has been demonstrated by experiments carried out near Eugene, Oregon. 13·2% of the preharvest drops were found to be infested as compared with 2·3% of the harvested nuts. While gathering and burning the drops once a week during the preharvest season seems adequate in normal years, growers are advised that more frequent pickings are required under the pollinizers, especially the Daviana variety, which is particularly favoured by the worm. The cost of pest control by sanitation is reported to compare very favourably with that of spraying. As regards the filbert worm, a reduction in the population as a result of destroying preharvest drops should be evident in the following year, but with the weevils no benefit must be expected before at least two years have elapsed. An alternative method to picking up premature drops is to have pigs in the orchard.

1045. STUBBINGS, W. A. K., AND HATTINGH, C. C. 634.21-2.78
Control of codling moth in apricots by spraying.
Fmg S. Afr., 1945, **20**: 369-72, 384.
Codling moth infestation of apricots in the Wellington and Tulbagh districts, South Africa, is estimated at 35%. It was the object of the preliminary spraying trials carried out at Oakdene, Wellington, to determine the most favourable dates for applications of fixed nicotine. The chemical, which, in contrast to lead arsenate, does not injure the foliage or fruit or affect the natural enemies of the pest, was used at the rate of 8 lb. per 100 gal. (5% nicotine) or 3½ lb. per 100 gal. (14%). The following recommendations are made: The Royal variety should be sprayed twice, about the middle of October and 10 days later, unless a very heavy infestation renders a third application, again 10 days later, advisable. Early blossoming varieties, such as Alpha, should be sprayed for the first time during the first week of October, the rest of the spray schedule being identical with that for Royal.

1046. SIEGLER, E. H., AND GERTLER, S. I. 632.78
Toxicity of diaryl trichloroethanes and dichloroethylene to codling moth.
J. econ. Ent., 1944, **37**: 845, bibl. 3.
A comparative test showed that the insecticidal action of DDT against codling moth was superior to that of some related compounds examined.

1047. SIEGLER, E. H., SCHECHTER, M. S., AND HALLER, H. L. 632.78: 632.951
Toxicity of ricin, ricinine and related compounds to codling moth larvae.
J. econ. Ent., 1945, **37**: 416-8, bibl. 10.
The only effective killing agents of the compounds tested were ricinine (1,2-dihydro-4-methoxy-1-methyl-2-oxonicotinonitrile) and 1,2-dihydro-1,4,6-trimethyl-2-oxonicotinonitrile.

1048. Barnes, M. M. 632.78
A dust experiment for codling moth control in a heavy infestation.
J. econ. Ent., 1944, **37**: 620-3, bibl. 2.
The result of a dusting trial with 20% lead arsenate and varying concentrations of Black Leaf 155 and Micronized Dusting Sulfur indicates that a dusting program of this type for codling moth control should be resorted to only if spraying is not possible. Codling moth injury in the treated plots amounted to 15-20% entrances with about 30% stung fruit.—Cornell University, Ithaca, N.Y.

1049. Yothers, M. A., and Carlson, F. W. 632.78
Repellency of pyrethrum extract and other materials to full-grown codling moth larvae.
J. econ. Ent., 1944, **37**: 617-20, bibl. 1.
Of 250 formulas tested a 5% pyrethrum extract with 5% or 10% of cotton seed oil, emulsified with blood albumin, was found to be the most effective repellent to mature codling moth larvae.

1050. Alexander, C. C., and others. 632.951
The use of oleic acid and aluminium sulfate to increase deposits of nicotine bentonite.
J. econ. Ent., 1944, **37**: 610-7, bibl. 6.
Based on the criterion of number of worms per 100 apples 1: 5 dry-mix nicotine bentonite (3 lb. per 100 gal.) applied with mineral oil (1 qt.), oleic acid (0·25 pt.) and aluminium sulphate (2 oz.) proved as efficient, though not so economical, as lead arsenate in controlling the codling moth in the Pacific North West.

1051. Carter, G. A., and Hardy, C. H. 634.11-2.793
Role of the wetter in apple sawfly control.
Agriculture, 1945, **51**: 563-6, bibl. 12.
The significance of a wetting agent as a component of a nicotine spray for apple sawfly (*Hoplocampa testudinea*) control is discussed. Experiments in an orchard containing Worcester Pearmain showed that the efficacy of a 0·05 nicotine spray is improved by the addition of Ester Salts Solution at a concentration of 0·125%. Higher concentrations of the wetter did not further improve results.

1052. Anon. 632.5
Tiger pear *(Opuntia aurantiaca)* is spreading.
Agric. Gaz. N.S.W., 1945, **56**: 96.
Tiger pear infestations, unwittingly caused and fostered by cactus lovers, are becoming an increasingly serious menace in New South Wales. Control is exercised both by mechanical means and biologically by introducing the insect parasite *Dactylopius* sp. near *confusus*.

1053. Palmiter, D. H., and Hamilton, J. M. 632.952: 634.1/7
Results of field and greenhouse experiments with new fungicides on orchard fruits in 1944.
Proc. N. York St. hort. Soc. 90th annu. Meet. 1945, pp. 16-20.
Reports are given of tests of fermate, dithane, puratized N5X and isothan Q15 on apple scab and rust; of fermate and dithane on cherry leaf spot and brown rot and of fermate, dithane, Elgetol and Dow Dry-Mix against peach leaf curl and sooty blotch and Fabraea of apple. Dithane was disappointing against scab. It and the other materials were otherwise promising.

1054. Webster, R. L. 632.951
Insecticide situation in the Pacific Northwest.
J. econ. Ent., 1944, **37**: 818-21, bibl. 2, being *Sci. Pap. Wash. agric. Exp. Stat.* **614**.
Half of the paper is devoted to a discussion of the problems associated with the application of arsenicals in Washington, while data on cryolite, rotenone, pyrethrum and nicotine applications in the State are presented in the remaining two pages.

1055. Hansberry, R. 632.951: 634/635
Substitute insecticides for fruit crops and ornamentals [in U.S.A.].
J. econ. Ent., 1944, **37**: 347-9.
The value of cryolite and nicotine as second line defences against codling moth in the now probably unlikely absence of lead arsenate is reviewed. In Washington State cryolite is considered the equal of lead arsenate in all respects, including costs and at any season. Outside the Pacific North West it has been less satisfactory and nicotine is preferred, either with bentonite as a fixed, partially insoluble compound or in water-soluble form in oil. The cost is higher than that of cryolite. Cryolite gave no control of the apple maggot in 1943 in the Hudson Valley, though previously it had shown promise. Thiocyanate sprays are only 75% as good as pyrethrum against citrus thrips. Nicotine sulphate is good against *Heliothrips haemorrhoidalis* but must be thoroughly applied and is liable to cause illness among the operators. Pyrethrum and rotenone are the only satisfactory insecticides against cranberry insects.

1056. Callan, E. McC. 632.951
Two new insecticides DDT and 666.
Trop. Agriculture, Trin., 1945, **22**: 98-9, bibl. 3.
A brief review of some of the possibilities of DDT and an even newer production known provisionally as 666 (benzene hexachloride).

1057. Smit, B. 632.951
The new D.D.T. insecticide.
Fmg S. Afr., 1945, **20**: 337-40, 356.
Growers are warned that the use of D.D.T. as an insecticide against agricultural pests may do much harm to beneficial insects, such as wasp parasites, bees and other pollinators. More research on this material is demanded.

1058. Fleck, E. E., and Haller, H. L. 632.951
Compatibility of DDT with insecticides, fungicides and fertilizers.
Industr. Engng Chem. (*industrial edition*), 1945, **37**: 403-5, bibl. 4.
The anhydrous chlorides of iron, aluminium and chromium were shown to be active catalysts in the dehydrohalogenation of DDT. In the case of anhydrous ferric chloride the catalytic action was promoted by solution in naphthalene and other solvents and inhibited by various hydrocarbon and fatty oils, alcohols, ketones, acids and anhydrides. The following insecticides and fungicides did not affect the stability of DDT: Sodium fluorite, sodium fluosilicate, cryolite, Paris green, calcium arsenate and lead arsenate, lime sulphur and 2,3-dichloro-1,4-naphthoquinone. A list of fertilizers, which showed no catalytic activity, is also given.

1059. Edmonton, W. E., and Vining, H. W. 634.11-2.76
Field trials with D.D.T. against apple blossom weevil.
Fruitgrower, 1945, **100**: 44, 48.
D.D.T. achieved notable success in field trials (not in randomized plots) with a few trees and cordons against apple blossom weevil. The spray 0·1% D.D.T., 3½% lime-sulphur and ester salts as a spreader, was applied on 16 March. Control trees were very badly capped and the reduction in capped blossoms due to treatment amounted to 77·7% on orchard trees and 94·3% on cordons.

1060. Norris, D. O. 632.951
The evaluation of D.D.T. as a fungicide.
J. Coun. sci. industr. Res. Aust., 1944, **17**: 289-90.
Laboratory tests, in which 5 fungus species were used, showed that D.D.T. had no fungicidal properties in respect of the test organisms.

1061. SWINGLE, M. C., MAYER, E. L., AND GAHAN, J. B. 632.951
Further tests of synthetic organic compounds as insecticides.
J. econ. Ent., 1944, **37**: 672-7, bibl. 3.

Sixty-four synthetic organic compounds were tested for insecticidal action against from four to eight species of economic insect pests. Fourteen were toxic to at least a few species and are discussed in some detail. The most toxic compounds were 4-bromoacetophenone, a volatile fumigant and contact insecticide; p-bromo-N-ethylbenzenesulfonamide, a fairly toxic stomach insecticide but injurious to foliage; 4,6-dinitro-o-cresol propionate and 2,4-dinitrophenol propionate, very toxic compounds but injurious to foliage; and 4-methylcyclohexanone semicarbazide, a fairly toxic stomach insecticide but injurious to foliage. Fifty compounds were relatively nontoxic and are listed by name only. [Authors' summary.]

1062. SYNERHOLM, M. E., HARTZELL, A., AND ARTHUR, J. M. 633.841: 632.951
Derivatives of piperic acid and their toxicities towards houseflies.
Contr. Boyce Thompson Inst., 1945, **13**: 433-42, bibl. 19.

Though piperic acid itself (derived from the dried fruit of *Piper niger*, i.e. black pepper) was not toxic to insects, a wide variety of its esters and substituted amides were toxic towards house-flies. The most toxic amides were those derived from primary or secondary alkyl amines containing 3 to 7 carbon atoms. In the ester series the most effective are derived from alcohols with more than 3 but less than 7 carbon atoms.

1063. MOREAU, R. E. 632.951
Derris agronomy: An annotated bibliography and a critical review. Parts I-III.
E. Afr. agric. J., 1944, **10**: 75-82, 168-76, 243-50.

The literature on derris-growing is of recent date, by far the greater part of the approximately 230 references cited in part III being later than 1930. The annotated bibliography is preceded by a review, which discusses the published data (with the addition of some unpublished for East Africa) under the following heads: selection and breeding (with a table showing the toxic contents attained); variability; climate and derris; shade; the age for harvesting; root character and toxicity; the effect of manuring; yields and spacing; propagation by cuttings; staking; pests and diseases; histology and biochemistry of rotenone in derris plants. The author summarizes his conclusions as follows: "On the whole results and opinions are remarkably inconclusive and conflicting. There is a wide field for carefully planned experimentation. The Tanga Province of Tanganyika Territory is at present practically the only producer of high-grade derris root in the British Empire. Production and prospects elsewhere are mentioned. The Tanganyika derris industry is based on clonal material of *D. elliptica* Changi type, with satisfactory toxic content, but not nearly so good as the more recent selections in Java and Malaya. Commercial production in Tanganyika is all in climates cooler or drier, or both, than thought desirable in the Far East. Maturation is much slower than elsewhere, so that harvesting is not recommended before 30 months, compared with 18 to 24 elsewhere. Excellent yields have been obtained on soils, as well as in climates, that would, on experience elsewhere, be classed as unfavourable."—East African Agricultural Research Institute, Amani.

1064. BRAY, G. T. 632.951
The relationship of the diameter of *Derris* roots to the rotenone content.
J. Soc. chem. Ind. Lond., 1944, **63**: 384.

The chemical examination of *Derris elliptica* roots from 6 sources in the British Empire confirmed the generally held opinion that the thinner roots, but not the very fine rootlets, are richer in rotenone and extract than the thick ones.—Imperial Institute, London.

1065. GRAHAM, L. T., SANDSTEDT, R. M., AND TATE, H. D. 632.95
Wheat flour as an adhesive for sprays.
J. econ. Ent., 1944, 37: 599-604, bibl. 5.

Wheat flour alone and in combination with lime was found to increase the tenacity of sprays, insoluble copper sulphate being used as an indicator. Eight ounces or more of wheat flour (1 oz. or more of soybean flour) +0·4-1·6 oz. of lime per 100 gal. spray were determined as the optimum amounts. —Nebraska Agricultural Experiment Station.

1066. YOUNG, P. F. 632.95: 634.1/7
Spraying problems and new development in control equipment.
Proc. N. York St. hort. Soc. 90th annu. Meet. 1945, pp. 115-21.

ZEHNER, W. H.
Air blast and high pressure sprayer tests.
Proc. N. York St. hort. Soc. 90th annu. Meet. 1945, pp. 122-6.

BURRELL, A. B.
A sixteen nozzle swivel mounted spray gun for orchard use.
Proc. N. York St. hort. Soc. 90th annu. Meet. 1945, pp. 126-30.

In the first of these the author discusses a so-called spray mast and the speedsprayer. The former consists of a mast or pipe installed in a vertical position on the rear of the sprayer. On it are mounted 6 guns which ensure a spread of about 16 feet of fog being applied to the tree at one time. The speed sprayer, which was first used in the citrus groves of Florida, has now been used for some 5 years in apple orchards. Particulars of it and its performance are given here, with special note of the use in it of the two-way head. Large claims are made with certain limitations for the superior merits in general of air blast sprayers compared with those of normal high pressure sprayers.

Burrell describes the mechanism and use of a cheap, swivel-mounted spray gun. Under proper conditions it proves quick and economical in apple orchards. It is unsuitable where thorough coverage of the lower surfaces of the leaves of heavy-foliaged trees or complete coverage of fruit is essential.

1067. BRONSON, T. E., AND DUDLEY, J. E., Jr. 632.943
A positive feeding device for application of dust mixtures.
J. econ. Ent., 1944, **37**: 538-9.

An experimental apparatus was successfully constructed at Wisconsin University for insuring accurate rates of application of dust mixtures. The construction is fully described and there is one photographic illustration of the completed appliance on which the various working parts are named. The device cost 100 dollars.

1068. HOCKEY, K. C. 632.95
"Crawler" spray outfits in Hawke's Bay.
N.Z. J. Agric., 1945, **70**: 484-5.

A brief note on 3 types of "crawler" spray outfits, which in Hawke's Bay orchards are gaining prevalence over the piping system.

1069. KING, H. L., AND FREAR, D. E. H. 632.944
Relation of chemical constitution of some N-heterocyclic compounds to toxicity as fumigants.
J. econ. Ent., 1944, **37**: 629-33, bibl. 9, being *J. ser. Pap. Pa agric. Exp. Stat.* **1228.**

Emphasis was placed on a study of the relationship between toxicity [to the red spider, the large milk-weed bug and the confused flour beetle] and length, position and type of side chain. In all of the tests carried out it was evident that in a series of 2-*n*-alkyl-pyridines a pronounced peak of

toxicity occurred at the propyl- or butyl-derivative. Alkylpyridines with side chains in the 4-position were more toxic than the 2-substituted isomers and compounds with normal side chains were usually more toxic than the branch isomers. The two alkyl piperidines available were more toxic than the corresponding pyridines. [From authors' summary.]

1070. LEÃO, M. DE A. 632.944
Expurgo de produtos agrícolas em pequenas quantidades. **(Disinfecting small quantities of agricultural products.)**
Publ. Serv. Inform. agric. Rio de J. **15** (*S.I.A.* **726**), 1944, pp. 15.
Five small fumigation chambers, of which 4 are portable, such as can be built at home of brick or wood for the fumigation of seeds, fruits, etc., are described and their construction illustrated with scale plans. The methods of use are also discussed.

1071. BAKER, H. 632.78
(15) **Effect of scraping and banding trees upon the numbers of transforming and hibernating codling moth larvae.**
J. econ. Ent., 1944, **37**: 624-8, bibl. 13.

CAHN, R. S., PHIPERS, R. F., AND BRODATY, E. 632.951
The stability of derris in insecticidal dusts. The solvent-powder effect.
J. Soc. chem. Ind., Lond., 1945, **64**: 33-40, bibl. 72.

CARLSON, F. W., CASSIL, C. C., AND YOTHERS, M. A. 632.78
Ether-extract content of codling moth cocoons.
J. econ. Ent., 1944, **37**: 711, bibl. 3.

CUTRIGHT, C. R. 632.654.2: 632.95
Populations of the European red mite as affected by spray schedules.
J. econ. Ent., 1944, 37: 499-502.

ELAZARI-VOLCANI, Z. 632.48
Observations on *Sclerotinia sclerotiorum* in Palestine.
Palestine J. Bot. (*R*), 1944, **4**: 206-7.

FAHEY, J. E. 634.11-2.951
Estimation of undecomposed DDT spray deposits on apples from total organic chlorine content.
J. Ass. off. agric. Chem. Wash., 1945, **28**: 152-8, bibl. 5.

HOCKEY, J. F., PICKETT, A. D., AND NEARY, M. E. 632.95: 634.11 + 634.13
Spray calendars for apples and pears suitable for Nova Scotia, 1945.
Eighty-first A.R. Nova Scotia Fruitgrs' Ass. 1944, 1945, pp. 126-9.

HODGSON, R., RIKER, A. J., AND PETERSON, W. H. 632.314
Polysaccharide production by virulent and attenuated crown-gall bacteria.
J. biol. Chem., 1945, **158**: 89-100, bibl. 32.

HOOGERHEIDE, J. C. 631.46: 632.952
Antibiotic substances produced by soil bacteria.
Bot. Rev., 1944, **10**: 599-638, bibl. 145.

KING, H. L., FREAR, D. E. H., AND DILLS, L. E. 632.753
Relation of chemical constitution of some N-heterocyclic compounds to toxicity to *Aphis rumicis*.
J. econ. Ent., 1944, **37**: 637-40, bibl. 8, being *J. Ser. Pap. Pa agric. Exp. Stat.* **1230**.

NICKELS, C. B., AND PIERCE, W. C. 634.521-2.78
Control of the pecan nut casebearer [*Acrobasis caryae*] with lead arsenate, nicotine sulfate and summer oil.
J. econ. Ent., 1944, **37**: 510-2.

SWEETMAN, H. L., AND GYRISKO, G. G. 632.951
Latent injury from pyrethrum and rotenone dusts.
J. econ. Ent., 1944, **37**: 746-9, bibl. 3.
Test plant *Thermobia domestica*.

WEST, T. F., AND CAMPBELL, G. A. 632.951
The story of DDT and its role in anti-pest measures.
Chem. Industr., 1945, No. 20, pp. 154-9, bibl. 19.

WILSON, H. F., JANES, R. J., AND CAMPAU, E. J. 632.951
Electrostatic charge effects produced by insecticidal dusts.
J. econ. Ent., 1944, **37**: 651-5, bibl. 1.

WRIGHT, E. 632.4
Relation of macrofungi and micro-organisms of soils to damping-off of broadleaf seedlings.
J. agric. Res., 1945, **70**: 133-41, bibl. 17.

VEGETABLE, RUBBER AND OTHER PLANTS.

1072. ANON. 634/635: 631.521
Rules governing trials at Wisley. Plants and vegetables.
J. roy. hort. Soc., 1945, **70**: 177-8.
The rules governing permanent and invited trials of plants and vegetables at Wisley are briefly expounded, the object of the trials being to ascertain the merits of new varieties and strains.

1073. TAYLOR, H. V. 635.1/7
The national vegetable programme.
Vegetable and Fruit Growers' Conferences. Littlebury & Co. Ltd., Worcester, England, 1945, pp. 7-10.
In this paper given at a Conference held at Worcester in December 1944, Dr. Taylor shows how the acreage under vegetables had expanded from 275,000 pre-war to 450,000 in 1944, the chief increase being in outdoor tomatoes 2,300%, onions 806%, peas 333%, carrots 119%, green vegetables 51% and cauliflowers and broccoli 33%. Flowers, hardy nursery stock, asparagus, rhubarb and celery all showed considerably diminished areas. In reply to a question he disclosed the fact that a committee had reported on the need for research, and the Government had accepted the report and was prepared to put it into action. The committee had urged the need for developing a research station for vegetables, an improved station for glasshouse crops and more research for fruit.

1074. LE ROUX, J. C., AND OTHERS. 635.1/7(68)
Vegetable production in South Africa.
Bull. S. Afr. Dep. Agric. **255**, 1945, pp. 112, 1/-.
Vegetable production in South Africa dates back to the garden at the Cape established by Van Riebeek, about 300 years ago, for the purpose of supplying passing ships with fresh vegetables. To-day, vegetables in the Union are grown commercially on an area of about 40,000 acres. In the preface of this small manual growers are urged to overcome two prejudices: (1) against mechanization and (2) against the use of South African seed, the latter being quite unjustified in the case of seed certified by the Government. The bulletin consists of 13 chapters by different authors dealing with the basic principles of vegetable production under South African conditions, the use of Karoo manure, disease and pest control, marketing, preserving, etc. The main part is devoted to instructions (by different authors) on the growing of 28 common vegetables with shorter notes on 6 uncommon vegetables

(artichokes, the cardoon, Chinese cabbage, okra, sou-sou or choko, salsify or oyster plant) and 10 culinary herbs. A vegetable sowing chart attached to the bulletin advises on the date of sowing according to area (there are 6 areas), on the method and depth of sowing, distance, transplanting, etc.

1075. BEYNON, V. H. 635.1/7: 631.16
Reports on methods and costs of production of some vegetable crops in S.E. Carmarthen and the Gower Peninsula.
Publ. Univ. Coll. Wales, Aberystwyth, 1944, pp. 34 (mimeographed).
The information presented was obtained from 33 farms for the period 1942-4 and relates to the following market garden crops: Spring cabbage, beans, savoy, onions, carrots and parsnips.

1076. MEUNISSIER, E. 635.1/7: 398
Les légumes dans le folklore. **(Folklore of some vegetables.)**
Rev. hort. Paris, 1943, **115**: 304-6, bibl. 18.
Some interesting local customs and superstitions in regard to garden vegetables are recorded.

1077. PERRONNE, P. 635.1/7(65)
Légumes de grande consommation. **(Staple crop vegetables in Algeria.)**
Bull. Inspect. gén. Agric. algér. **38**, 1941, pp. 16.
Carrots, turnips, cabbage, onions and leeks. Methods of cultivation on a commercial scale in Algeria both for consumption and for seed.

1078. ANON. 664.84.047: 635.65
Production des légumes secs en Algérie. **(Production of dried legumes in Algeria.)**
Bull. Inspect. gén. Agric. algér. **89**, 1943, pp. 20.
The cultivation and treatment of various peas, beans and lentils for use as dried pulses is described for Algeria. Some wartime regulations regarding declaration of amount of harvest are included. No grower was allowed to retain more than 36 kg. per head for family consumption of the combined total weight of the varieties grown.

1079. BUGAKOV, A. 635.1/7: 631.523
The creators of new varieties. [Russian.]
Socialističeskoe Zemledelie (Socialist Agriculture), 1944, No. 119, p. 2.
This is a short account of the activities of the Gribovo Selection Station, founded at a state farm in the vicinity of Moscow in 1920; it has produced during 25 years of its existence many varieties of cabbage, tomato, onion, carrot, table beet, cucumber, pumpkin, etc., which are grown at the present time everywhere in the U.S.S.R. The station produces annually 75% of all the élite vegetable seeds used in the R.S.F.S.R.

1080. WALLACE, T. 635.1/7: 631.452
The maintenance of soil fertility.
Vegetable and Fruit Growers' Conferences. Littlebury & Co. Ltd., Worcester, England, 1945, pp. 17-9.
Dr. Wallace concludes that the essentials for the maintenance of fertility in horticultural crops are deep cultivations to ensure good aeration; a large water reservoir; adequate supplies of organic matter; the presence of enough but not excessive lime; mineral nutrition to suit particular crops; free drainage with an adequate water supply.

1081. GOODWIN-WILSON, R. 631.42: 634/635
Analysis of horticultural soils.
Sci. Agric., 1944, **25**: 175-8.
The paper, which was read before the Canadian Society of Technical Agriculturists in June 1944, summarizes the results of an extensive survey of horticultural soils in Canada begun in 1937. Samples of greenhouse (ornamentals and vegetables) and intensely cultivated vegetable soils (Upland and peat and muck) were tested for readily available N as NO_3, K, P, Ca, Mg, SO_4, Cl. The average levels of nutrients found are separately recorded and in some cases desirable levels are indicated. The soil analyses, for which rapid methods were employed, have proved useful in the production of ornamentals and vegetables.—Ontario Agricultural College, Guelph.

1082. BUNTING, A. H. 635.1/7: 631.849
Sewage sludge and the market gardener.
Agriculture, 1945, **52**: 123-6.
In the process of sewage sludge production about two-thirds of the nitrogen, one-half to two-thirds of the phosphorus and most of the potash are estimated to be lost and to go down the rivers, the average N, P_2O_5 and K_2O content of sewage sludge being 2·5, 2 and 0·1-0·2% respectively. Digested sludge, which is preferable to raw sludge, has a moisture content of 10% after drying and is easily reduced to a powder. Although much inferior to farmyard manure in nutrient content and physical effects digested sewage sludge has its value to the market gardener as a carrier of slowly available phosphorus and nitrogen. It should be applied at the rate of 5-10 tons per acre and be supplemented by applications of potash. A method of composting sewage sludge with straw, which results in a manure of the physical appearance and (according to some experiments) effect of dung, is described: "Long, narrow, layered heaps of sludge and straw are constructed, using 1½ tons sludge dry matter to one ton of straw. The straw layers are made about 18 inches thick, and the straw must be well tossed about. Land tiles and vertical 'chimneys' made by building round stakes or branches and subsequently removing them, provide aeration. Four hundred gallons of water are needed to each ton of straw, and the water is added after the sludge, layer by layer. Up to 600 gallons of water per ton should be added as the heap heats up. Three to six months are needed for satisfactory rotting."—Rothamsted Experimental Station.

1083. ČAĬLACHJAN, M. H. 631.84
Contribution to the theory and practice of use of nitrogen fertilizers.
C.R. Acad. Sci. U.R.S.S., 1944, **43**: 387-90, bibl. 4.
Excess of nitrate fertilizers was found to have a beneficial effect on the development of oats, white mustard, blue lupin, millet, soya and southern hemp, as measured by height and dry weight of plants and weight of seeds. The generally accepted rule that in the case of nitrogen excess nitrate fertilizers have the effect of delaying the succession of developmental phases should therefore be amended and should read: In the case of nitrogen excess, nitrate fertilizers delay the succession of developmental phases in some plants and accelerate the development in others.—K.A. Timiriazev Institute of Plant Physiology.

1084. TAWELL, G. H. 635.1/7: 631.67
The irrigation of vegetable crops.
Vegetable and Fruit Growers' Conferences. Littlebury & Co. Ltd., Worcester, England, 1945, pp. 11-6.
The author notes that irrigation necessitates the locking up of considerable capital and the use of considerable intelligence in planning and execution. He claims as advantages (1) the overcoming of drought, (2) the prevention or cure of such plagues as greenfly, fleabeetle and mildew, (3) the production of 3 or 4 crops as against one on a given piece of ground, (4) the stimulation of beneficial bacteria and hence of soil fertility, (5) the improvement of vegetable quality. He considers in a practical manner the conditions which affect success of overhead irrigation, e.g. temperature —which must not be too low—, type and texture of soil—a thin soil low in organic matter will suffer by irrigation—, consolidation of soil—land takes water best when solid. The correct time to irrigate is all important. Thus, if

irrigation is done before the crop is in, it is preferable to apply the water before ploughing when the land is solid. Ploughing follows as soon as possible and a roll should then be given to trap the moisture. Surface tilthing with harrows or discs comes next and then the crop is drilled or planted. As regards the watering of growing crops a good watering for several hours is greatly preferable to frequent sprinkling. For water supply a deep well boring is probably the best permanent source. The broad principles of equipment and layout are considered. The possibility of incorporating fertilizer in the irrigation water appears likely to be useful and in the author's opinion should be the subject of early enquiry at the proposed Vegetable Research Station. Finally, approximate (1944) figures are given for necessary items of expenditure. It is thought that the initial expenditure of a small man starting from scratch but with surface water available would be about £200.

1085. (Brown, C. A. C.) 631.588.1: 635.1/7
Electricity and market gardening.
Gdnrs' Chron., 1945, **117**: 274.
Mr. Brown, speaking to a northern branch of the N.F.U., noted that electricity is already successfully used for soil heating of salad growing in hot beds. Other possibilities envisaged are for deep soil heating in glasshouses, for potting and box work, and for tomato soil sterilization *in situ*. He considers, moreover, that market gardens are likely in the future to make great use of bare wire heating by transformer-cum-low voltage, the technique for which will be built up.

1086. Bomford, D. R. 635.1/7: 631.51
The mechanization of vegetable production.
Vegetable and Fruit Growers' Conferences. Littlebury & Co. Ltd., Worcester, England, 1945, pp. 21-6.
Captain Bomford, after discussing at some length and making suggestions for the specifications of a tractor for horticultural work, notes that the ideal type depends largely on the work for which it is to be used. He considers its adaptability for the following functions:—machine planting, drilling, inter-row cultivation, inter-plant hoeing, rotary tilling, and overhead irrigation.

1087. Stoutemyer, V. T., Close, A. W., and Reid, F. R. 583.4: 581.14
Sphagnum moss as a medium for growing plants.*
Nat. hort. Mag., 1944, **23**: 32-8, bibl. 8.
An illustrated account of the use of sphagnum moss for starting the growth of vegetable and other plants. Particular notes are given on tests with hollies, egg plant, pepper, tomato, watermelon and muskmelon. Freedom from damping off was noticeable. Moreover, certain plants found difficult to grow in soil under Washington D.C. conditions, such as *Rubus macrocarpus*, do well in sphagnum. Various species of cinchona grow more easily in the greenhouse in sphagnum than in soil. Grapes, figs, palms and many other woody plants do well in the moss, as do cacti and succulents. So far as is known, virtually all plants can be grown indefinitely on sphagnum with the occasional application of mineral nutrients in solution without frequent renewal of moss.

1088. Lawrence, W. J. C. 631.531
How does seedling treatment affect the crop ?
John Innes Bull. **1**, 1945, pp. 9-24.
The author discusses in some detail experimental data on the effects of various horticultural practices on seedlings of tomato and other plants. Among other conclusions reached are the following:—Effects of minor differences of treatment are considerable and long lasting. Traditional usage is unreliable. *Pricking-off and potting-off.* Pricking-off of tomatoes into pots should be done as soon as the seedling has pushed far enough through the soil to be handled —i.e. much earlier than is usual. *Pot size.* There are indications that, other things being equal, the larger the pot the more rapid the development and the earlier the fruiting. *Watering.* Withholding water from pot plants makes them shorter-jointed. Over-watering in moderation results in long-jointedness. A considerable check is given to young plants by under-watering. Provided cultural conditions are good, it appears not to be very important to take the chill off the water used for seedlings and pot plants. Moreover tap water, even if of moderate hardness, is generally at least as good as rain water. Dipping seed pans and pots in water up to the brim has nothing to commend it and watering with a rose can is greatly preferable. *Cultural conditions.* Tomatoes raised under moderately warm conditions develop more quickly and fruit earlier than those raised under cool conditions. The use of cold (40° F.) soil for picking off was not found harmful to tomato, lettuce and streptocarpus. *Compost.* The character of this is extremely important. The results achieved and conclusions reached above are based on the use of the J.I. composts. Both good compost and cultural practice are essential to success.

* See also *H,A.*, 15: 464.

1089. Lawrence, W. J. C., and Newell, J. 631.875
Questions about composts. What is the best leaf mould ?
John Innes Bull. **1**, 1945, pp. 25-6, 27.
Practical notes on the ingredients of the John Innes composts, on the storing and mixing of loam and compost and on the rotting of leaf mould of different origins.

1090. Lawrence, W. J. C. 635.64: 632.8: 631.875
Does composting destroy virus ?
John Innes Bull. **1**, 1945, pp. 7-8.
Trials at Merton show that the tobacco mosaic virus is not destroyed by composting infected tomato plants and that diseased compost can infect the roots of plants in contact with it. On the other hand no harmful effects were seen from the use of virused compost as a dressing for out-of-doors tomatoes.

1091. Lawrence, W. J. C., and Newell, J. 631.462
How can a silt soil be sterilised ?
John Innes Bull. **1**, 1945, p. 28.
Directions are given for overcoming the difficulties which have been met by persons using the John Innes sterilizers for silty soil. The remedies, which are two, consist essentially in modification of the perforated plate of the sterilizer or in the admixture of peat with the silty soil before sterilization.

1092. Newell, J. 631.462
Can borders be sterilised with a small boiler ?
John Innes Bull. **1**, 1945, pp. 29-30.
One method of sterilizing tomato borders in small glasshouses is set out in detail here: it consists of the use of a high pressure vertical boiler. The boiler successfully used at Merton was a vertical one, 7 ft. by 3 ft., evaporating 450 lb. of water in 1 hour (7½ h.p.), working at a maximum pressure of 80 lb. The distance from the boiler to the farthest sterilizing point was 205 ft. The grids and the working of the whole apparatus are described.

1093. Lawrence, W. J. C., and Newell, J. 631.544.4
Saving fuel [in glasshouse furnaces].
John Innes Bull. **1**, 1945, p. 31.
Tests with a proprietary fuel economizer of a type which is fitted on the front of the furnace door and allows a current of pre-heated air to pass into the furnace showed no saving from its use. A considerable saving was achieved in other ways, viz. greater efficiency in stoking, ensuring a good fit of the furnace doors and seeing that doors, windows, ventilators, etc., were not left open unnecessarily.

1094. HOCKEY, J. F. 631.531.17
Seed treatments.
Eighty-first A.R. Nova Scotia Fruitgrs' Ass. 1944, 1945, pp. 47-9.
Notes on the appropriate substance to use for treating the seed of a number of common vegetables. Among the substances are New Improved Ceresan, Semesan, Arasan, Spergon and corrosive sublimate.

1095. NEWELL, J. 631.516
What is the use of hoeing ?
John Innes Bull. **1**, 1945, pp. 3-6.
Trials show that under Merton conditions hoeing is useful as being the only means of controlling weeds, but that hoeing to conserve moisture or for the general good of the soil is a waste of time.

1096. MUMA, M. H. 632.76
The attraction of *Cotinus nitida* by caproic acid.
J. econ. Ent., 1944, **37**: 855-6.
The green June beetle was found to be attracted by caproic acid diluted 50% with light white mineral oil.

1097. HOWARD, N. F. 632.951
Substitutes for vegetable insecticides.
J. econ. Ent., 1944, **37**: 345-6, bibl. 1.
Useful substitutes recommended by U.S.A. Bureau of Entomology for the usual insecticides in short supply on account of the war are discussed. (1) Calcium arsenate for lead arsenate on potatoes, tomatoes, and egg plants; (2) within limits, cryolite for rotenone on crucifers and beans; (3) nicotine for rotenone in some anti-aphid mixtures; (4) calcium arsenate and cryolite for rotenone on cucurbits; (5) dusting sulphur for lime-sulphur against potato psyllid; (6) sodium fluosilicate for paris green in cutworm bait; (7) dichloroethyl ether for mercury salts against cabbage maggot. Substitutes which show promise are phenothiazine for rotenone in bean beetle and cabbage worm control, and dinitrocyclohexylphenol for pyrethrum against potato leaf hopper, especially on beans. Some failures mentioned are pyrethrum against cabbage looper and imported cabbage worm, rotenone dust 0·5% against European corn borer and many proprietary rotenone dust mixtures against Mexican bean beetle, chiefly because they contained insufficient rotenone.

1098. GERASIMOV, V., AND OSNICKAJA, E. (GERASSIMOV. OZNĬZKAJA as given). 635.1/7: 632.951/2
Creolin in the control of pests and diseases of vegetable crops. [Russian]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1944, No. 4, pp. 46-8.
Creolin in the form of an emulsion has been used successfully against insect pests of onion and cabbage, as a fungicide against *Cladosporium* and *Botrytis* and as a disinfectant for the interior of glasshouses and frames, particularly where the spider mite was present. It cannot be used as a seed disinfectant for, if its concentration is to be strong enough, it will harm the seed.

1099. APPLE, J. W., AND RICHARDSON, C. H. 632.951
Comparative toxicities of copper hydro-arsenate and copper hydroarsenate-arsenite mixtures.
J. econ. Ent., 1944, **37**: 666-71, bibl. 12, being *J. Pap. Ia agric. Exp. Stat.* **J1219**.
The toxicity of the two new arsenical products, copper hydroarsenate and copper hydroarsenate-arsenite, to imported cabbage worm, adult spotted cucumber beetles and 3 other pests was compared on a weight basis with certain standard arsenical insecticides. Paris green proved to be the most toxic compound against all insects tested, closely followed by reacted paris green-calcium arsenate and cupric meta-arsenite. The two new copper arsenical products were shown to have a stronger action on cabbage worm than calcium arsenate, while the latter was equally effective against the spotted cucumber beetle as the arsenate-arsenite product but superior to copper hydroarsenate. Both new copper arsenicals are reported to cause much less damage to bean foliage than the older arsenicals.

1100. PALTI, J., AND MOELLER, S. 632.952
Overhead application of fungicidal sprays.
Palestine J. Bot. (*R*), 1944, **4**: 184-92, bibl. 5.
In preliminary trials, the control of powdery mildew and *Alternaria* blight of potatoes and of cucumber downy mildew (*Peronoplasmopara cubensis*) by spray applications from the overhead irrigation system was shown to be practicable. Although the amount of spray material required was 2-3 times as high as that used in ordinary spraying, the obvious great advantages of the new method are believed to outweigh this drawback.—Agricultural Research Station, Rehovot.

1101. HOOKER, W. J., WALKER, J. C., AND LINK, K. P. 632.42: 632.952
Effects of two mustard oils on *Plasmodiophora brassicae* and their relation to resistance to club root.
J. agric. Res., 1945, **70**: 63-78, bibl. 20.
The two mustard oils, whose effect on the germination of resting *Plasmodiophora brassicae* spores was studied, are allyl and β-phenethyl isothiocyanate. As a result of the investigation the theory is refuted that the presence of these oils in certain *Cruciferae* roots is related to resistance to clubroot. It is thought most unlikely that oil concentrations of 100-240 p.p.m., which are necessary for the inhibition of spore germination, can be maintained outside the root in the soil. The liberation from the roots of minute quantities, on the other hand, would have a stimulating effect on the pathogen.

1102. SHERWOOD, L. V. 632.5
Field bindweed, *Convolvulus arvensis* L., root fragments may grow.
J. Amer. Soc. Agron., 1945, **37**: 307-13.
Surface type cultivations were found to be superior to other types in preventing the spread of field bindweed by root fragments. Fragments of less than 3 in. long hardly constitute a danger. The chance of regrowth of root fragments is reduced if cultivation is carried out on a dry soil.—Agricultural Experiment Station, Urbana, Ill.

1103. ANON. 632.954
Weed control by kerosene and sulphuric acid.
N.Z. J. Agric., 1945, **70**: 175-7.
Tests of the efficacy of kerosene and sulphuric acid as selective herbicides in carrot and onion crops respectively were conducted by the N.Z. Department of Agriculture and the results are reported by Officers of the Fields Division. Although the most favourable time for spraying with power kerosene was when the seedling carrots had formed two "fern" leaves, applications at stages from seedling leaves 1 in. high up to the early "fern leaf stage" achieved successful control without injury to the crop. Further conclusions reached are: (1) Young weeds are killed more easily than mature weeds; (2) the spray should contact stems as well as leaves in the case of excessive or mature weed growth; (3) good results are apparent 24 hours after spraying; don't spray the same crop twice; (4) the most favourable condition for spraying is calm dry weather. A 10% sulphuric acid solution applied just after the seedling leaves have straightened is recommended for weed control in onions, which suffer only a temporary check.

1104. BLACKMAN, G. E. 632.954
The control of weeds by chemical means.
Vegetable and Fruit Growers' Conferences. Littlebury & Co. Ltd., Worcester, England, 1945, p. 20.
A brief note on the use of sulphuric acid and dinitro-ortho-cresol for weed control.

1105. BLACKMAN, G. E. 577.15.04: 632.954
A comparison of certain plant-growth substances with other selective herbicides.
Nature, 1945, **155**: 500-1.

The relative effectiveness of cupric chloride, ammonium dinitro-orthocresol, sodium 4-chloro-2-methyl-phenoxy-acetate and sulphuric acid for the control of 19 annual weeds is summarized. The data, based on 2 years' experiments involving over 3,000 plots, show that, when applied at the rate of 100 gallons per acre at concentrations within which each chemical is truly selective, the several herbicides have a specific effect on different weed species. The research has been extended to cover annual weed control in grasses, clovers, flax and linseed, peas, onions, leeks and perennial weeds in grassland. In flax, copper chloride and the sodium salt of dinitro-ortho-cresol have given the most promising results, while selective weed control in onion and leek crops was practicable only with sulphuric acid and cupric chloride. The study was carried out by a team of research workers of the Imperial College of Science and Technology, London.

1106. SLADE, R. E., TEMPLEMAN, W. G., AND SEXTON, W. A. 577.15.04: 632.954
Plant-growth substances as selective weed-killers. Differential effect of plant-growth substances on plant species.
Nature, 1945, **155**: 497-8, bibl. 5.

Thirty-two growth substances tested for their selective phytocidal action are grouped in 3 classes according to their activity in comparison with α-naphthylacetic acid. Seventeen compounds are listed in class A with an activity greater than that of α-naphthylacetic acid, 8 compounds in class B were found to equal the standard growth substance and 7 in class C showed some activity. In field experiments with sodium 4-chloro-2-methyl-phenoxyacetate, applied as a spray at the rate of 1 lb. in 100 gallons per acre or as a dust with china clay as a diluent at the rate of 2 lb. of active principle per acre, the following weeds were eradicated from cereal crops: yellow charlock, white charlock, corn buttercup, pennycress, fat hen, corn marigold, corn spurrey and field poppy. The work is being continued at several research departments of the I.C.I. (Imperial Chemical Industries).

1107. VAN DER PLANK, J. E., AND WASSERMANN, J. W. 633.491-2.8(68)
Mass production of virus-free potatoes [in South Africa].
Nature, 1945, **155**: 794-5, bibl. 7.

An exposition of the Riet River Settlement scheme, where it is intended to produce about 5,000 tons of virus-free potato seed annually to cover the requirements of the South African industry.

1108. CAMPBELL, W. M., AND EVANS, G. 633.491-1.532.2
Experiments in the use of potato eyes for seed at Kew.
J. roy. hort. Soc., 1945, **70**: 142-6.

The demand for seed potatoes from the overseas dependencies is increasing. To reduce transport costs, and also because shipments can then be made by air, cut potato chips containing the eyes are substituted for the whole potato. Experiments with these chips at Kew led to the following conclusions:—The best method of preparation is to slice off the rose end about ¼ inch thick, place the cut ends in a thin layer on a wooden floor and cover with damp sacking for 48 hours. The chips are then kept in a frost-proof, darkened shed and are best covered lightly with straw to prevent too rapid shrinking. A yield somewhat lower than from whole tubers must be expected. There is no need to break dormancy before cutting. Viability will be retained for 6 weeks and the biggest yield was obtained from chips which had been dried for a month. Close planting in the row has given the best results so far. The discarded sections of the tubers can be used for processing in various ways.

1109. MCDERMOTT, N. 633.491-1.532.2
Potato chips as seed.
Agriculture, 1945, **52**: 11-5.

Experiments with cut potato chips as seed were carried out at the Midland Agricultural College in 1944. Full details of the trials are given. Some of the conclusions reached are: The longer treatments of drying for 3 or 4 weeks resulted in a high proportion of misses, though there may have been some adverse influence from a drought period. The sets should be prepared and shipped before there is pronounced sprout growth. Chips dried for two weeks gave 6½ tons per acre less than whole seed which produced 18½ tons per acre. Chips dried for 3 and 4 weeks gave a lower yield than those dried for 2 weeks. Tendency to elongation of tuber in some round or oval varieties was increased by chipping, e.g. with Epicure and British Queen. King Edward, Gladstone, Arran Chief and Kerr's Pink produced plants with a high proportion of small tubers, long stolons and fibrous roots. Cut sets produced bigger, though fewer, large ware than uncut. The varieties giving outstandingly good performance combining good shaped ware, good yields and plant counts were Eclipse, Duke of York, Arran Banner and Majestic. Other varieties that gave promising results were: Arran Pilot, Epicure, Dunbar Rover, Arran Consul and Dunbar Standard.

1110. ANON. 633.491-1.532/535
Les divers modes de multiplication de la pomme de terre par marcottage, par bouturage et par fragmentation des tubercules. **(Various ways of propagating the potato by layers, cuttings and chips.)**
Rev. hort. Paris, 1944, **116**: 32-6.

Seven writers describe various "fancy" ways of propagating the potato which are of interest in view of the present research into the preparation of potato propagation chips for shipment abroad.

1111. PČELKIN, V. 633.491-1.532.2
Planting slices from the crowns of potato tubers in the Trans-Ural region. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1944, No. 1, pp. 24-30.

Storage of potato slices consists in covering the slices with soil, and keeping them at a temperature of 2° to 3° C. until they are ready for planting. The turgor of slices which have become too dry during storage can be restored by keeping the slices in moist earth for 8 to 10 days. Vernalization of slices is carried out in wet sand at 12° C. for about 3 weeks before planting. Slices planted close together result in a greater yield than when planted far apart, but the tubers are smaller and mature sooner. Vernalization increases the content of starch; it also causes early sprouting, so that a late frost in spring sometimes damages them. Vernalized tubers should therefore not be planted too early. The differences resulting from close and wide spacing are much reduced if vernalization has been done. Slices need to be planted shallower than whole tubers. Slices from large tubers gave larger yields than slices from small tubers, and also than small whole tubers.

1112. ČELJADINOVA, A. (CHELIADINOVA, A.) 633.491-1.532.2
The summer-planting of freshly harvested potato tubers in Tadgikistan. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1944, No. 4, pp. 15-20.

Potato tubers can be made to sprout at all stages of their development, a higher temperature, however, being necessary in the early stages than in the late. Suitable conditions of moisture and aeration must also be ensured. The

propagation of potatoes in summer by means of crown slices or halves offers several advantages, but a somewhat large proportion of the sets suffer decay. Three methods of sprouting newly-gathered tubers, preparatory to planting are described.

1113. GLUŠČENKO, I. (GLUSHCHENKO, I.) 633.491-1.532.2
The rôle of skin in the dormancy period of freshly harvested potato tubers in Tadgikistan. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1944, No. 4, pp. 12-14.
The texture of the potato skin from the tubers of early potatoes was found, as a result of microscopic examination, to differ from that of the skin from potato varieties maturing later. This difference accounted for the greater readiness to sprout which was observed among the later varieties. Removal of the skin from tubers curtailed the dormancy period. Plant breeders are advised to breed potato varieties whose skins admit of easy aeration and are of such a texture as to facilitate sprouting with the least possible delay.

1114. TURLAPOVA, A. 633.491-1.541
Development of an early industrial variety of potato by grafting. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1944, Nos. 5-6, pp. 28-30.
As a result of grafting Wohfmann on Early Rose the vegetative hybrid, No. 400, was produced; while the two vegetative hybrids, Nos. 392 and 395, resulted from grafting Korenevskii on Early Rose. The hybrids matured within a period not much longer than that of Early Rose, and they contained more starch which, furthermore, accumulated more rapidly than in Early Rose.

1115. DE SOROA, J. M. 633.5
Las fibras textiles. **(Textile plant fibres.)**
Publ. Minist. Agric. Madrid, 2nd edition, 1941, pp. 84.
Deals with the preparation of textile fibres from plants cultivated in Spain, more especially flax and esparto grass.

1116. FORSYTH, D. D., AND VOGEL, O. A. 633.52-1.531
Effect of seedcoat injuries during threshing on emergence of flax.
J. Amer. Soc. Agron., 1945, **37**: 387-93, bibl. 6, being *Sci. Pap. St. Coll. Wash.* **629**.
Small microscopic cracks and bruises in the seedcoat were found to affect emergence of flax significantly. The presence of certain organisms in the soil, mainly *Fusarium oxysporum*, was recognized as another cause of reduction in stand.

1117. MILLIKAN, C. R. 633.52-2.4
A " false " browning reaction to rust (*Melampsora lini*) infection in flax.
J. Dep. Agric. Vict., 1945, **43**: 83-92, bibl. 15.
A browning disease of flax, somewhat similar in appearance to that produced by *Polyspora lini*, occurred in its severe form in the Strathkellar and Koo-wee-rup districts, Victoria, in early November during the three seasons 1942-4. Milder cases have been noted elsewhere. " False " browning lesions were found to be always associated with a heavy infection of abortive uredospore pustules of the rust *Melampsora lini* and to be usually confined to the upper half of the affected plants. In each season, the outbreak occurred approximately one week after sudden hot spells, artificial heat treatment for 30 hours (37° C. at about 85% relative humidity) producing identical lesions around the rust pustules. The results of histological studies of normal rust-infected tissues, treated rust-infected tissues and natural " false " browning lesions are reported in detail and illustrated by photomicrographs. The effect of the disease on fibre yield and quality is not known at present.

1118. MILLIKAN, C. R. 633.52-2.19: 546.72
Iron deficiency chlorosis of flax.
J. Dep. Agric. Vict., 1945, **43**: 133-4, bibl. 6.
Severe symptoms of chlorosis of flax, causing the death of many plants, occurred at Westmere, Victoria, in 1943 on about 10 acres of a black, self-mulching soil which contained a high percentage of limestone (pH 8·2). With the onset of warm weather in October, however, the surviving plants regained their green colour and reached a height of 20 in. Pot experiments showed that iron deficiency was the cause of the trouble, which could be cured by spraying with, or applying heavy dressings of, iron sulphate. The results of time-of-sowing-trials agreed with the observations previously made in the field. Flax plants grown during the winter months exhibited symptoms of marked chlorosis, while those grown in summer in the same pots were normally green. The conclusion is drawn that the availability of iron to the plants is related to temperature. In the wetter soils and at low soil temperatures the deficiency symptoms were most pronounced.

1119. COLHOUN, J. 633.52-1.531.17
The prevention of seed-borne diseases of flax. III. The dusting, short wet and fixation methods of seed disinfection in relation to storage of the seed.
Ann. appl. Biol., 1945, **32**: 34-7, bibl. 5.
The fungicidal dust Nomersan (tetramethylthiuram disulphide) applied at the rate of 12 oz./cwt. to flax seed containing up to 10% moisture was found to have no harmful effect on germination, when the seed was tested after storage periods of up to 18 months. Further experiments showed that the short wet and fixation methods of disinfection can be safely employed with flax seed without impairing its viability, if the initial moisture content is under 6% and the amount of liquid used does not exceed 0·67 gal. per cwt. The treated seed can be stored for at least 3 months, but this period may be extended if the storage conditions are good.—The Queen's University of Belfast.

1120. MILLIKAN, C. R. 633.52-2.4
" Damping off " disease of flax.
J. Dep. Agric. Vict., 1945, **43**: 177-81, bibl. 10.
Pythium sp. was the only fungus consistently isolated from lesions of flax seedlings associated with the damping off disease. In a seed treatment experiment made on a soil where an untreated crop had failed in the previous season, it was found that New Improved Ceresan (4 oz. per bushel) was superior to all other fungicidal dusts tested in increasing plant establishment. A further test showed that flax seed treated with New Improved Ceresan must be sown as soon after treatment as possible to avoid a marked depression in germination power and abnormal developments in the seedling. Applications of lime had no effect on the incidence of pre-emergence damping off.

1121. PAL, B. P., AND RAO, T. N. 633.71-1.531
Does acclimatized cigarette tobacco seed deteriorate ?
Ind. Fmg, 1944, **5**: 516-7.
The widespread belief that imported Virginian tobacco seed deteriorates after 2 years' growing in India was tested at the Tobacco Research Substation, Guntur, and found to be without foundation. It is suggested that the lower quality of Indian-grown American cigarette tobacco results from impurity rather than from acclimatization.

1122. CLAYTON, E. E. 633.71-2.42
Resistance of tobacco to blue mold (*Peronospora tabacina*).
J. agric. Res., 1945, **70**: 79-87, bibl. 8.
Of some 1,000 collections of *Nicotiana tabacum* from all parts of the world (in particular from Mexico and Central and South America) tested, none showed any appreciable resistance to blue mould, caused by *Peronospora tabacina*.

Many wild *Nicotiana* species, however, which were also tested on a large scale, proved highly resistant, and successful crosses of 4 species with *N. tabacum* are reported. Expression of resistance was complicated by many factors, among which the age of the plant was most significant.

1123. KEYWORTH, W. G. 633.79-2.4
Three important hop diseases.
Agriculture, 1945, **51**: 556-61.
The hop diseases discussed and illustrated are the fungus disease *Verticillium* wilt, both the fluctuating and the progressive type, and the virus diseases nettlehead and mosaic. A map shows the incidence of *Verticillium* wilt in south-east England, distinguishing between fluctuating, progressive and severe progressive outbreaks. The significance of vigilance, roguing and the Ministry's Certification Scheme in combating these three diseases is emphasized.—East Malling Research Station.

1124. MAS-GUINDAL, J., AND MAS-GUINDAL, A. 633.85
Las plantas oleaginosas. Sus productos y aplicaciones. **(Oil plants, their products and uses.)**
Publ. Minist. Agric. Madrid, undated (1942-3), pp. 214, bibl. 68, 2 pesetas.
An account of the more important oil-bearing plants of the world.

1125. MAUME, L. 633.85-1.8
Étude sur le développement et la nutrition du tournesol Grand Soleil en Languedoc méditerranéen. **(A study of the growth and nutrition of the sunflower Grand Soleil in Languedoc.)**
Ann. Éc. Agric. Montpellier, 1944, **26**: 3: 1-25.
The sunflower takes a good deal out of the soil. When growth begins, i.e. from the fourth leaf, the demand for K_2O exceeds that for N; at the appearance of the flower bud assimilation of K_2O and N is about equal; the need for K_2O reasserts itself during flowering and until harvest. The P_2O_5 requirements are much lower and remain fairly constant until the seed is forming, when it increases by about one-third. The paper contains much other information.

1126. LANSON, H. J., HABIB, D., AND SPOERRI, P. E. 633.85
Milkweed seed oil. Potential value in protective coatings.
Industr. Engng Chem. (*industrial edition*), 1945, **37**: 179-81, bibl. 8.
The seeds of *Asclepias syriaca* contain about 22% oil which can be readily refined and is of potential value for protective coatings. The chemical and physical characteristics of the oil are reported.—Polytechnic Institute of Brooklyn, N.Y.

1127. ANON. 633.862.1
Last of the woad farmers.
Gdnrs' Chron., 1945, **117**: 286.
The death is announced of Mr. Thomas Booth, the last of the English woad farmers. He grew woad (*Isatis tinctoria*) for commercial purposes and the last crop was grown at his farm, Woad Farm, Kingsway, Boston, Lincs., in 1936.

1128. POLHAMUS, L. G. 633.913
Rubber from guayule.
Agric. Amer., 1945, **5**: 27-30.
A survey of recent developments in the cultivation of guayule in the United States and Latin America under the Emergency Rubber Project. It is concluded that in Latin America a good start has been made in laying the foundation for economical guayule growing and that the shrub must be seriously considered as a contributory source of rubber after the war.

1129. MITCHELL, J. W., WHITING, A. G., AND BENEDICT, H. M. 633.913
Rubber content, stem anatomy and seed production as related to rate of vegetative growth in guayule.
Bot. Gaz., 1945, **106**: 341-9, bibl. 8.
From pot experiments carried out by the U.S. Bureau of Plant Industry, Beltsville, Md, the total rubber production of a guayule plant (*Parthenium argentatum*) was found to be directly related to the amount of growth made by the plants during the summer growing season. Seed collected during spring and autumn gave a relatively high percentage germination and was affected in number and quality by the adequacy of the nutrient supply. Low percentage germination was obtained from summer produced seed irrespective of the amount of Ca and N supplied to the plants. The relative area of bark (i.e. the overall area of bark: the area of bark occupied by non-rubber-bearing fibre) remained constant under various, but not deficient, nitrogen supplies. A slight thickening of the bark which occurred after small supplies of Ca and N was not reflected in an increase of rubber percentage.

1130. LANGE, W. H., Jr. 633.913-2.6/7
Insects affecting guayule with special reference to those associated with nursery plantings in California.
J. econ. Ent., 1944, **37**: 392-9, bibl. 4.
Guayule (*Parthenium argentatum*) has a large insect fauna associated with it and some have become dangerous since cultivation was extended. The paper presents information collected in 1942 on insects causing injury in nursery and field plantings in the Salinas Valley of California, and the methods of control which proved successful are mentioned.

1131. WARMKE, H. E. 633.913
Experimental polyploidy and rubber content in *Taraxacum kok saghyz*. [Russian.]
Bot. Gaz., 1945, **106**: 316-24, bibl. 14.
Diploid and tetraploid races of kok saghyz were obtained by colchicine treatment at the Department of Genetics of the Carnegie Institution of Washington, Cold Spring Harbour, New York. Combined greenhouse and field tests showed the tetraploids to have larger roots and higher rubber percentage than the diploids. The water content of diploid and tetraploid roots did not differ significantly. A low positive correlation was observed between root weight and rubber percentage for field grown diploids and tetraploids and for greenhouse grown diploids and a slight negative one for greenhouse tetraploids. On a basis of calculated rubber yield (dry weight of roots × percentage of rubber) the tetraploids produced an average of 0·195 g. or three times as much as the diploids.

1132. KOLESNIK, I. 633.913
To enhance the quality of kok saghyz seeds. [Russian.]
Socialističeskoe Zemledelie (Socialist Agriculture), 1944, No. 107, p. 2.
This short article contains a number of practical hints for collective farmers cultivating kok saghyz seed plots in the Ukrainian districts liberated from German occupation, which became neglected during that period. The author advocates vegetative propagation by cuttings of those plants which have a high rubber content and also selection of large roots with high rubber content from 1-year-old plantations and the transplantation on special seed plots. The bulk of the paper is devoted to the latter procedure. Sound, large roots should be selected during harvesting and planted within 1-2 days, but not later than the end of September, on a well ploughed and fertilized seed plot 30 cm. apart in a row with an interspace of 60 cm. between the rows. After planting the soil is loosened between the rows and the roots; in the early spring the plot should be thoroughly inspected and all the exposed

roots covered up with soil. Subsequent cultivation technique should be the same as that for 2-year-old plantations.

1133. BRAGINA, F. 633.913
Some experience in planning the crops of kok saghyz. [Russian.]
Socialističeskoe Zemledelie (Socialist Agriculture), 1944, No. 111, p. 2.

In accordance with the decree of People's Commissariat of Agriculture of the U.S.S.R., Suzdal district of the Vladimir Province—in which this plant has been grown since 1936—is to produce commercial crops of kok saghyz. The author describes in this short paper how collective farmers of the district combined profitable growing of kok saghyz with the raising of other industrial plants and vegetable seeds, and what rotational courses were adopted on each farm. As a result of planning 70% of collective farms in the district had to grow crops of *Nicotiana rustica* and vegetable seeds, and the remaining 30% kok saghyz. A comparison with previous years showed that by such planning the total area under kok saghyz in the district was considerably increased. Fifteen per cent. of the collective farms had an area of about 20 hectares under kok saghyz, 65% 10 to 15 hectares and 20% 5-10 hectares. Each worker in a team responsible for the kok saghyz on each farm was allocated 0·10 to 0·12 ha. of the planted area which was on that section of the arable land situated as near as possible to the livestock farm; this facilitated the application of farmyard manure and saved a great deal of labour. A four field rotational course (1) bare fallow; (2) and (3) kok saghyz and (4) winter wheat, potatoes, roots, green feed, etc., was found to be most suitable for commercial crops of kok saghyz.

1134. FILIPPOV, D. 633.913-1.535.6
The production of kok-saghyz from root cuttings. [Russian.]
Socialističeskoe Zemledelie (Socialist Agriculture), 1944, No. 114, p. 2.

Root cuttings of kok saghyz were planted in the late summer. No shoots appeared that year but there was abundant growth the following summer. The roots were twice the size of those of 2-year-old plants grown from seed, and contained a higher content of rubber.

1135. MIHAÏLOV, N. (MICHAILOV, N.) 633.913-1.85
The possibility of substituting superphosphate by phosphorite meal when manuring kok-saghyz in podzol districts. [Russian.].
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1944, No. 4, pp. 28-30.

Where kok saghyz is grown on acid podzols, phosphorite meal has proved to be an adequate substitute for superphosphate. In such soils the meal is decomposed sufficiently to make the phosphatic elements available to the plants, more especially during the second part of the growth period. If the application of the meal is large enough, the quantity of phosphate available may also suffice during the early growth period.

1136. GORIAINOV, M. (GORJAINOV). 633.913-1.433
The effects of the osmotic pressure of soil solution on the development and chemical composition of kok-saghyz. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1944, Nos. 5-6, pp. 44-5.

Kok saghyz was grown in pots. The concentrations of the soil solution were so adjusted that osmotic pressures of 1 to 8 atmospheres were obtained. Up to 2 atmospheres the yields of leaves and roots were increased; above that pressure they were decreased. The assimilation of different salts was likewise increased. The content of inulin was unaffected; that of rubber was increased as the pressure rose to 4 atmospheres; that of resins was unaffected by the lowest and highest pressures, and at medium pressures was a little less than the control.

1137. BULGAKOV, S. W. 633.913: 581.144.2
Modified anatomical structure in kok-saghyz roots and its biological import.
C.R. Acad. Sci. U.R.S.S., 1944, **45**: 35-8, bibl. 9.

When particularly thick and heavy kok saghyz roots obtained by selection were examined microscopically at the All-Union Institute of Rubber Plants, the following modification in their anatomical structure was observed: There was no single central cylinder, but the vascular bundles, scattered throughout the parenchyma, sometimes 10 or more in number, were surrounded by a cambium of their own and each of them had a system of laticiferous vessels. In the progeny of such roots the modification became more conspicuous. In some cases the upper root part had the appearance of " spread fingers " each of which formed at its tip a stem structure of the caudex type bearing the bases of one or several rosettes. In other cases the disintegration of the mother root went so far that a bundle of independent roots was dug up which were sometimes linked by thin cross-pieces. The extraordinary prospects which the production of natural clones offers to the breeding of large-rooted varieties are discussed.

1138. PROKOFIEV, A. A. 633.913: 581.192
On the synthesis of rubber in plants. II. On the probability of rubber migration in plants.
C.R. Acad. Sci. U.R.S.S., 1944, **44**: 162-4, bibl. 7.

In order to decide whether the laticiferous vessels function as conducting tubes for the transportation of rubber from the leaves, cuttings of 2-3-months-old roots of rubber plants were grafted together. Six or seven days after grafting both stock and scion formed a callus from which, after a further few days, roots and leaflets began to grow. Within the genus *Taraxacum* the union between stock and scion was perfect. Other combinations were also made. Shape and size of the rubber globules being distinctly characteristic of every species, the microscopic examination of the latex would reveal any rubber migration from stock to scion and vice versa. The results show that the latex does not move in the laticiferous vessels and the conclusion is drawn that in root rubber plants the synthesis of rubber takes place in the root in the tissues where it is accumulated.

1139. PROKOFIEV, A. A. 633.913: 581.13
On the synthesis of rubber in plants. III. Photosynthesis and rubber formation in plants.
C.R. Acad. Sci. U.R.S.S., 1944, **45**: 307-9, bibl. 6.

The author's experiments, undertaken at the K.A. Timiriazev Institute of Plant Physiology, tend to prove that rubber formation in the root of rubber plants does not depend on the production of specific rubber precursors in the leaves. For instance, in grafts of a dandelion scion on a kok saghyz stock the laticiferous vessels of dandelion showed the normal poor rubber content, while those of the kok saghyz component were much larger and well filled with rubber. Even more striking were the results obtained in combinations of kok saghyz as stock with *Lappa*, which does not produce any rubber at all. Although the union was much less perfect than with grafts within the genus *Taraxacum*, rubber globules typical in size and shape of kok saghyz latex were clearly produced in the stock part of the roots.

1140. NIČIPOROVIČ, A. A., AND IVANITZKAJA, E. F. 633.913: 581.14: 581.192
On the relation between leaf development and formation of laticiferous vessels in roots of kok-saghyz and krym-saghyz.
C.R. Acad. Sci. U.R.S.S., 1944, **44**: 33-6, bibl. 6.

While three of the factors determining the rubber content of kok saghyz and krym saghyz roots, namely the number of laticiferous vessels in every circle, the diameter of the vessels and the rubber content in the vessels, are highly variable, a fourth factor, viz. the rhythm of the formation

of the concentric circles in which the laticiferous vessels are arranged is extremely stable. The aim of the present investigation was to determine whether there was any relation between the formation of those circles in the root and the formation of leaf cycles. Although such a relation was not found to exist, it could be shown that the thickening of the root, which is associated with the formation of a larger number of circles of laticiferous vessels, depends on the number of leaves produced within the period of intense leaf formation. Hence, it is concluded, cultural practices should aim at the production of a maximum number of leaves at the earliest stage.—K.A. Timiriazev Institute of Plant Physiology.

1141. TAUSSON, W. O. 633.913: 581.144.2
Conditions of formation, development and differentiation of a callus [in Russian rubber plants].
C.R. Acad. Sci. U.R.S.S., 1944, **45**: 213-6, bibl. 11.

(1) The formation and further differentiation of a callus from cambium requires a gaseous exchange more intense than that which proceeds in a normal, intact root. The cutting of the root, resulting in a local increase of the gas exchange, stimulates therefore the development of a callus at the point of incision. (2) In the case of maximum gas-exchange intensity, i.e. under conditions of liberal aeration, a differentiation of the developing callus into leaves soon sets in; the growth of the callus itself is thereby considerably slowed down, and is later arrested altogether. (3) Where gas-exchange intensity is intermediate between the one characterizing an intact root, and that taking place if there is a free oxygen supply to an unprotected cambium and callus, the latter preserves its meristematic activity during an indefinite period of time, and grows without any differentiation, forming tumour-like structures. (4) Where gas exchange is reduced in a callus at various stages of its early differentiation, the callus undergoes but partial differentiation, giving rise, along with tumour-like structures, also to leaf-like or scale-like malformations. The processes referred to above can be controlled by modifying these conditions.—K.A. Timiriazev Institute of Plant Physiology. [From author's summary.]

1142. BELIKOV, P. S. 633.913: 581.144.2
A contribution to the problem of rubber formation in the roots of kok-saghyz.
C.R. Acad. Sci. U.R.S.S., 1944, **45**: 209-12, bibl. 6.

(1) Under conditions of constant humidity of the roots, the content of rubber in them also remains constant, (2) the wilting of roots is accompanied by an increase in their rubber content, (3) if the roots are subjected to surgical treatment under conditions of good aeration, there is a decrease in their rubber content; the decrease being the more intense, the larger the amount of latex lost by the laticiferous vessels during the operation; (4) under conditions of hindered gaseous exchange the roots become richer in rubber.—The Institute of Rubber Plants. [Author's summary.]

1143. SCRIPTURE, P. N., AND MCHARGUE, J. S. 635.15: 546.27
Boron supply in relation to carbohydrate metabolism and distribution in the radish.
J. Amer. Soc. Agron., 1945, **37**: 360-4, bibl. 6.

1. Radishes were grown in sand culture with boron supplied to the nutrient solution at the rate of 0·00, 0·25, 0·50, 1·00 and 5·00 p.p.m. 2. Yields of the radishes were determined and the tops and bulbs analysed separately for soluble and insoluble carbohydrates. A concentration of 0·25 to 0·50 p.p.m. of boron in the nutrient solution appeared to be optimum for the radish. 3. A deficiency of boron was found to cause an accumulation of direct reducing sugars, sugars hydrolized by invertase, and alcohol-insoluble acid-hydrolizable carbohydrates in the tops, and an accumulation of sugars hydrolized by invertase and alcohol-insoluble acid-hydrolizable carbohydrates in the bulbs. Direct reducing sugars were found to be lower in the bulbs of the boron-deficient plants than in those receiving the required amounts of this element. 4. From these results it seems that boron must be functional in the metabolism and translocation of carbohydrates.—Kentucky Agricultural Experiment Station. [Authors' summary.]

1144. LAUMONT, P., AND COSTE, A. 635.24
Le topinambour. (The Jerusalem artichoke.)
Bull. Inspect. gén. Agric. algér. **63**, 1942, pp. 4.

How to grow the Jerusalem artichoke in Algeria where it has long been grown but on a small scale.

1145. TINCKER, M. A. H., AND OTHERS. 635.25
The production of onion sets.
J. roy. hort. Soc., 1945, **70**: 135-41, bibl. 4.

The production of onion sets from seed at Wisley in 1943 is described in full detail. Sowing dates were 12 and 22 May and 3 June. Weeding was by sulphuric acid spray at the 2-leaf stage. (For details of this treatment see *Advis. Leafl. Minist. Agric.* 309.) Extra nitrogen applied in the presence of adequate potash and phosphate had no effect on yield, grade sizes or on the sets grown to bulbs the following year. Covering with glass (continuous cloches) to increase temperature and decrease humidity, generally, but not always, reduced the number of useful sets. Between the several varieties used there was a wide difference in the percentage that formed bulbs. Ebenezer yielded 71% of the seed sown as usable bulbs, whereas Ailsa Craig B, the lowest of 10 recorded, only yielded 6%. However, much greater success in set forming was obtained at Rothamsted* under different conditions of soil and climate with 40 varieties including some from the same samples of seed that had failed at Wisley. Early lifting of sets was associated very consistently with early bolting the following year. After harvest thorough drying is necessary to prevent moulds and sprouting in storage. Grading is important to avoid planting bolters. Useful sets should be of about ½-in. diameter and not exceed ¾-in. Small sets give lower yields. The sets were tested the following year at Wisley, in Northumberland and in the West of Scotland and the results are reported. Costs of production are discussed. The variety Ebenezer proved to be the only early one reasonably free from bolting, and early maturing varieties are on the whole to be preferred. The actual yield with Ebenezer was 2 cwt. of onions per 1,000 sets from ½ oz. seed per square yard of sowing.

1146. CLYDESDALE, C. S. 635.25(943)
The onion.
Qd agric. J., 1945, **60**: 69-73.

The cultivation of onions, which is described, should give satisfactory results in many regions of Queensland, apart from those where the crop is grown now (Kingaroy, the Lockyer, Darling Downs and Central Queensland). Brown Spanish is the standard main crop variety, a number of other desirable varieties are briefly characterized.

1147. RAHMAN, K. A., AND BATRA, A. L. 635.25: 632.73
The onion thrips (*Thrips tabaci* Lind.: *Thripidae*: *Terebrantia*: *Thysanoptera*).
Ind. J. agric. Sci., 1944, **14**: 308-10, bibl. 8.

The life history of the onion thrips is described under Punjab conditions, where the damage to onions is highest during the period March-May and may amount to 75% in a dry season. By spraying with Black Leaf 40 the infestation was reduced by 82%.—Entomological Laboratories, Lyallpur.

* For an account of the Rothamsted trials see *Ann. appl. Biol.*, 1945, 32: 22-34; *H.A.*, 15: 1148.

1148. HOLDSWORTH, M. 635.25
A comparative study of onion varieties in relation to bolting and yield when grown from sets.
Ann. appl. Biol., 1945, **32**: 22-34, bibl. 9.

In order to test the practicability of growing onions from sets on a commercial scale under the climatic conditions of Britain two trials were carried out, each of which was conducted with 25 varieties for two seasons and the intervening winter storage period. The effects of time of planting of sets and of size, as well as varietal differences in bolting, yield, earliness and set behaviour in storage were studied, the results being presented in tables, diagrams and two photos. The following conclusions were reached: "Among those tested, varieties were found which bolted little and gave high yields when grown from sets, but it is emphasized that names of varieties as listed in seedmen's catalogues may not be reliable. Efforts are being made to maintain and improve by selection the most satisfactory of these strains. Late planting of sets is not recommended, for, although bolting was effectively controlled by these means, the yields were much reduced. Plants grown from large sets tended to bolt more than those from small, as has been shown by earlier workers; while on the contrary the yields from large and small sets were on the average alike. Comparing different varieties, the highest gross yields of all were produced from the large sets of non-bolting varieties; but for highest yields of bulbs *free from flower stalks* small sets should be used and this is advisable for all varieties. During storage the large sets lost less percentage weight than the small but they sprouted much more, and this is considered the more serious defect. The storage data demonstrate an additional disadvantage of late planting, for this involves longer storage and both sprouting and weight losses increase rapidly during late spring."—Imperial College of Science and Technology, London.

1149. MOSLEY, F. O. 635.25: 632.4
Use of calomel on onions.
Nature, 1945, **155**: 544-5, bibl. 1.

It is suggested as a result of 3 years' observations that calomel treatment of onion plants (¼ lb. per lb. of seed) will control eelworm as well as onion white fly and onion rot.

1150. DESLANDES, J. A. 635.25: 632.3/4
Doenças da cabola. **(Diseases of onions in Brazil.)**
Publ. Serv. Inform. agric. Rio de J. (*S.I.A.*) **98**, 1944, pp. 49, bibl. 24.

A comprehensive account of a number of onion diseases prevalent in Brazil and in other onion countries. The paper is well illustrated.

1151. BARBUT, M., AND CHEVALIER, G. 635.32(65)
Études sur la culture de l'artichaut en Algérie. **(Cultivation of the globe artichoke in Algeria.)**
Bull. Inspect. gén. Agric. algér. **33**, 1941, pp. 15, bibl. 9.

The bulletin records the results of work on the globe artichoke *Cynara scolymus*, carried out at the Institut Agricole of Algeria in 1939-40. In view of the paucity of the literature on this plant the investigations were very thorough. They comprise a description of 6 varieties, their chemical composition, yield, a more detailed study of the variety Violet d'Alger, manurial trials, food values and cultural requirements. Yield and consumer's preference determine the variety to be planted for the varietal differences in food value are negligible. Nutritional value cannot compare with that of the potato, which in addition only occupies the ground for 4 months against the artichoke's 10 months. Thus the artichoke is purely a vegetable for the gourmand and accordingly its cultivation during the war was officially discountenanced. In Algeria the plant was well suited to heavy clays, rich in potassium and well supplied with sodium chloride. The sodium chloride removed from the soil by a hectare of plants (2·47 acres) growing on such a site and planted 1 m. × 1 m. amounted to 860 kg. In the artificial fertilizer trials on land that had previously received 20,000 kg. per ha. of farm manure the best yield was obtained from a complete fertilizer, N 120 kg., P 96 kg. and K 160 kg. This produced 9,100 heads per ha. more than the control. The complete fertilizer also increased precocity of flowering over NP, NK and PK and after deduction of the cost of the fertilizers gave a larger financial profit. Of the various forms of nitrogenous fertilizers nitrate of ammonia produced the earliest heads and therefore the highest prices in the market.

1152. BARE, C. O. 635.34: 632.78
The attraction of *Verbena bonariensis* to the imported cabbage worm.
J. econ. Ent., 1944, **37**: 856.

Flowers of *Verbena bonariensis* were observed to possess great attraction for *Pieris rapae* butterflies. It is suggested that some substance may be obtained from these flowers which could be used as a bait for the pest.

1153. DILLS, L. E., FREAR, D. E. H., AND KING, H. L. 635.34: 632.77
Mercury substitutes for cabbage maggot control.
J. econ. Ent., 1944, **37**: 640-2, bibl. 10, being *J. Ser. Pap. Pa agric. Exp. Stat.* **1251**.

Of 36 different treatments tested a 10% calomel dust with bentonite as a carrier was found to give the best control of cabbage maggot, *Hylemia brassicae*, on early radishes without injuring the plants, while for late radishes dichloroethyl ether 1-200 was the most satisfactory material. Preliminary tests indicate that cabbage plants are less susceptible to damage and may be treated with some of the effective insecticides which cause injury to radishes.

1154. MACPHERSON, N. J. 635.52: 631.544
Glasshouse lettuce trials in Lancashire.
Agriculture, 1945, **52**: 117-20.

The two new glasshouse lettuce varieties 5a and 5b, produced at Cheshunt, were compared with Cheshunt Early Giant, the most widely grown glasshouse variety in Lancashire. Owing to its greater bulk and the higher proportion of first-grade heads the standard variety was found to realize about 3½d. more per dozen than the new strains when marketed in the neighbourhood. The more compact habit of 5a and 5b, however, should show to advantage, where marketing entails long rail journeys and rehandling of the crates. The lighter green colour is also regarded as a point in their favour.—Lancashire County Council Horticultural Station.

1155. SERENI, D. 632.42: 635.52 + 635.65
***Sclerotinia minor* on lettuce and beans.**
Palestine J. Bot. (*R*), 1944, **4**: 77-95, bibl. 18.

A detailed biological study was made in 1939 of the fungus *Sclerotinia minor*, which was isolated from soft rot of lettuce and blight of beans. The fungus causes great losses to vegetable growers in Palestine. Inoculations, both in the field and in the laboratory, were found to induce typical symptoms also in potatoes and in healthy fruits of orange, clementine, apple, pear and banana. Laboratory tests indicate that better control may be expected from mercury compounds than from copper sulphate or from the sulphur preparation Solbar. — Agricultural Research Station, Rehovot.

1156. WESTON, W. A. R. D. 635.53: 632.4
Leaf spot of celery (*Septoria* spp.).
Agriculture, 1945, **51**: 561-2.

The writer stresses the paramount importance of clean seed for the elimination of celery leaf spot, the life cycle of which is shown pictorially. For the production of clean seed regular sprayings with bordeaux mixture from seedling stage to time of seed formation are essential.

1157. Stocking, C. R. 635.62
The calculation of tensions in *Cucurbita pepo*.
Amer. J. Bot., 1945, **32**: 126-34, bibl. 32.
A new method of calculating tensions in the xylem of intact squash plants during normal growth and wilting is described. The method involves the observation in a refractometer of changes in the concentration of pure sugar solutions injected into the hollow petioles of the leaves.

1158. Reichert, I., and others. 635.63: 632.42
Field trials for the control of the downy and powdery mildew of cucumbers. I. On the efficacy of various copper compounds.
Palestine J. Bot. (*R*), 1944, **4**: 96-116, bibl. 30.
Eleven spraying and dusting trials for the control of downy mildew (*Peronoplasmopara cubensis*) and powdery mildew (*Erysiphe cichoracearum*) of cucumbers have been carried out in various parts of the coastal plain of Palestine over a period of years (1935-41) with the use of various copper compounds. The best control of downy mildew by frequent applications at 4 days' intervals was given by the Perenox spray, based on cuprous oxide, at $\frac{1}{3}$% strength. Of all the copper materials tested, only Perenox controlled powdery mildew satisfactorily. Bordeaux mixture (1%) failed to increase, or even reduced, the yield and was inferred to be injurious to cucumber foliage. Perenox, at $\frac{1}{3}$% strength, caused the leaf margins to turn yellow, while Cuprogreen Concentrated ($\frac{1}{3}$-$\frac{1}{2}$%) did not affect the leaves; the two sprays equalled one another, however, in their effect on the yield, which they increased by 30-70%. The effect of the copper dusts on the yield was not uniform. The copper treatments and especially the Perenox-oil spray, markedly increased the percentage of fruit picked during the last part of the fruiting period and thus extended the duration of the latter. Spraying is cheaper than dusting where labour is obtainable at low cost. But in young fields, where the quantities of dust required are still small, and which are particularly susceptible to spray injury, dusting may be preferable. — Agricultural Research Station, Rehovot. [From authors' summary.]

1159. Stern, W. T. 635.64
Where did the tomato originate ?
Gdnrs' Chron., 1945, **118**: 6, 18, 19, 30, 31, bibl. 19.
A very readable account of the origin of the present-day tomato which came to Europe during the first half of the sixteenth century probably via Peru to Spain and then Italy. Yellow and red fruited varieties were noted by Matteoli in 1554. The present form *Lycopersicum esculentum* subsp. *typicum* is closely related to plants which still grow wild in South Americas, namely the cherry tomato (*L.* subsp. *galeni* syn. *L. cerasiforme* and the currant tomato *L. pimpinellifolium*). A revision of the genus *Lycopersicum* was made by Muller in 1940 following an expedition sent by the U.S. Division of Plant Introduction to S. America in 1937 (*Misc. Publ. U.S. Dep. Agric.* 382), and Luckwill in 1943 made a further survey of the genus (*J. roy. hort. Soc.*, 58: 19-25; *H.A.*, 13: 199). Evidence afforded by pottery suggests Coastal Peru as its original home. Its common English name of tomato, which has displaced that of " love apple ", is derived from an American Indian, probably Mexican name by way of the Spanish " tomate ".

1160. Caldwell, J. 635.64
Tomato-growing in war time.
Agriculture, 1945, **51**: 73-5.
In connexion with wartime food production the experiments on tomato growing in Exeter were continued in 1944. A number of outdoor and greenhouse varieties were grown under specified conditions. Although, owing to the wet season, much of the later fruit had to be discarded, the average yield of sound fruit per outdoor plant amounted to 8·1 lb. All bush varieties tested proved disappointing from the point of view of yield (average 3·1 lb. per plant as against 10·7 lb. in the control plants of the Harbinger and Moneymaker varieties) and were found to involve more trouble in disbudding, dusting, etc. Despite the use of straw a comparatively high proportion of the fruit was lost by soft rotting. One of the trials conducted with indoor tomatoes demonstrated the importance of soil sterilization. As illustrated by a photo there was a striking difference in favour of sterilization between plants grown in John Innes compost made up from sterilized and non-sterilized loam.— University College of the South-West, Exeter.

1161. Morgan, C. N. 635.64(943)
Tomato culture in Queensland.
Qd agric. J., 1945, **60**: 78-82.
Approximately 6,360 acres were devoted to tomatoes in Queensland in 1942, the yield per acre averaging 100 bushels. About 80% of the State's production is derived from (1) the Metropolitan district, embracing the area within a radius of 25 miles of Brisbane and marketing all the year round, (2) the Stanthorpe Tablelands, with an average height of 2,500 feet, marketing from January to April and (3) the Bowen district, North Queensland, marketing from June to September. In the Metropolitan district, where part of the crop is grown on trellises, the output per acre is about 60% greater than that on the two other main areas, where wide planting and ground cropping is the general practice. In conclusion, a description of 11 widely grown varieties is given.

1162. Dubuis, A., and Frézal, A. 635.64(65)
Cultivez la tomate. **(Grow tomatoes.)**
Bull. Inspect. gén. Agric. algér. **41**, 1941, pp. 28.
The growing of spring, summer and autumn tomatoes in the open in Algeria is described. The stopping system advocated is different from that commonly used in England. In Algeria the plant is pinched back to the first flower truss as soon as it has formed, removing all leaves *above* it. Of the shoots which then develop in the axils below the truss, the two topmost are retained and trained to right and left on canes, the others are eliminated. As each of these shoots bears its flower truss, the terminal growth above the truss is pinched out except for one leaf, and extension growth as before proceeds from a shoot below the truss. On the two branch stems only one shoot at a time is allowed to develop. Since this method is apt to result in a possibly too great reduction of foliage, it has become the custom, when rubbing out unwanted shoots, to retain one or two of their lower leaves. The subject of pest and disease control is dealt with at some length.

1163. Powers, L. 635.64: 631.55
Relative yields of inbred lines and F_1 hybrids of tomato.
Bot. Gaz., 1945, **106**: 247-58, bibl. 22.
The yield of ripe tomatoes in areas having a short growing season can be greatly increased by using F_1 hybrids for producing the crop. All the F_1 hybrids have at least one parent derived from crosses between *Lycopersicum esculentum* and *L. pimpinellifolium*. The primary purpose of the study was to evaluate the F_1 hybrids derived from inbred lines produced from parents of wide genetic diversity and it was finally concluded that the greatest strides in breeding can be made by utilizing F_1 hybrids rather than inbred lines for the production of commercial crops.

1164. Savčenko-Beljskii, A. 631.541: 635.64
Something new in the analysis of breeding material. [Russian.]
Socialističeskoe Zemledelie (Socialist Agriculture), 1944, No. 111, p. 2.
E. M. Vermelj, working in N. V. Cicin's institute, has found that the size of the smallest cells in the plant is characteristic for a species and the size of the successively larger cells increases in geometrical progression. This characteristic cell size serves as an index of how far any given species can

be expected to be compatible with another species in grafting or distant hybridization.
Examples where the principle has proved applicable include grafts of *Cyphomandra* on tomato. The success of vegetative *rapprochement* for the purpose of wide crossing is ascribed to the modification of the cell size which it induces.

1165. CRANE, M. B. 635.64
Dwarf and bush tomatoes.
John Innes Bull. **1,** 1945, pp. 40-3.
An account of the salient features in the new dwarf and bush tomatoes which have recently been introduced into England. It is noted that the first dwarf of the type now grown in England was found in France and introduced by Vilmorin in 1860. The first bush tomato seems to have arisen as a chance seedling in Florida in 1914. There appear to be more names than varieties. Some of the bush varieties are liable to natural cross-pollination, hence for seed production varieties should be grown apart. Very valuable bush varieties have been produced in America and it is thought likely that varieties will be produced capable of finding a permanent place in British horticulture.

1166. GOODALL, D. W. 635.64: 581.145.2
The distribution of weight change in the young tomato plant. I. Dry-weight changes of the various organs.
Ann. Bot. Lond., 1945, **9**: 101-39, bibl. 71.
1. The dry-weight changes in the various organs of the tomato plant at the eight-leaf stage were followed in experiments continued through the whole 24 hours and performed at all times of the year. 2. The regression of the dry weights of the various organs on the lengths of the leaves and of the stem was used to follow the changes in these organs without mutilation of the plant during life. 3. For determining the dry weight a special drying-oven was constructed in which the material is placed in tubes surrounded by hot water; special spring balances were also employed. 4. The plants for the experiments were selected for uniformity in size. Only plants with alternate leaves were used, those in which the first two leaves were opposite being rejected. 5. From the dry-weight increases of the whole plant the relative growth-rates on the days of the various experiments were calculated. During the summer months they were rather higher than most of those recorded for other plants. This is the result of the high proportion that the leaves form of the total plant material; the mean net assimilation rate in the experiments during the six months of summer is slightly below the average of other plants. 6. A multiple regression of net assimilation rate on light duration, light intensity, day and night temperature, and humidity is calculated and shown to be highly significant; only light intensity, however, can be shown to have a *separate* effect on the net assimilation rate. 7. The hourly rate of increase in dry weight of the whole plant during the day does not differ very greatly in summer and winter; the much greater difference in relative growth-rate can largely be ascribed to the difference in duration of the light period. 8. The rate of increase in dry weight of the whole plant is higher in the morning than in the afternoon; this is probably due to the difference in light intensity. 9. During the evening the plant loses in dry weight much more rapidly in summer than in winter, although the mean temperatures differ very little. 10. The additional amount of assimilation produced in summer over that produced in winter goes mainly to the stem, the root, and the leaves (the second, third, and fourth), while the rates of increase of the older and the younger leaves do not differ greatly as between summer and winter. 11. At this stage the proportion of the plant formed by the root is decreasing, while that formed by the stem is increasing. 12. In proportion to the increase of the whole plant, the gain in dry weight of the young leaves is much greater in winter than in summer. 13. From the distribution of the dry-weight changes of the organs through the 24 hours, it is deduced that most translocation takes place during the daytime in summer, and that the time of greatest translocation is somewhat later than the time of maximum assimilation. [Author's summary.]—Imperial College of Science and Technology, London, and Experiment and Research Station, Cheshunt.

1167. EMMERT, E. M. 635.64: 581.192: 631.8
Plant tissue tests as a guide to fertilizer treatment of tomatoes.
Bull. Ky agric. Exp. Stat. **430,** 1942, pp. 48, bibl. 16.
It was the object of the investigation to determine, by rapid tissue tests, the concentrations of soluble nitrogen and phosphorus in the lower petioles of tomatoes at critical growth stages in relation to yield. The results showed that during the first 3-4 weeks after planting out a nitrogen concentration of well above 1,000 p.p.m. and a phosphorus concentration of about 200 p.p.m. are desirable, but that 1,500 p.p.m. of nitrogen or more had no detrimental effect in the presence of 200 p.p.m. of phosphorus. As the fruits begin to set, the nitrogen concentration should drop to 500-1,000 p.p.m., while phosphorus should be maintained at a level of 400 p.p.m. or more until ripening starts. Again, a higher nitrogen level, up to 1,500 p.p.m., did not prove harmful if sufficient phosphorus was available. After ripening has begun, however, a nitrogen concentration above 1,000 p.p.m. will affect yields. Both a restricted soil or sand volume in the culture and short days were found to favour nitrogen excess symptoms. In order to maintain a balanced carbohydrate-nitrogen ratio the nitrogen concentration should be reduced to about 500 p.p.m. in winter. Although it was beyond the scope of this study to work out fertilizer treatments by which the nitrogen and phosphorus levels recommended could be obtained, one way of reducing nitrogen excess and increasing fruit set is suggested: Place a band of phosphate at a 2-in. depth as close to the plants as possible at the rate of 1,000 lb. 20% superphosphate per acre. This treatment was particularly effective if applied to a phosphorus-fixing soil, in which the chemical may have become unavailable. The application of large amounts of rotted stable manure or green manure on a naturally fertile soil tended to produce an excess of nitrogen at the wrong time. Details of the tissue-testing method are discussed. The tomatoes were grown in soil and in sand culture media.

1168. HESTER, J. B. 635.64: 632.944
Cyanogas injury to tomato plants influenced by potash fertilization.
J. Amer. Soc. Agron., 1945, **37**: 319.
In a greenhouse fumigated with 5 g. HCN per 1,000 cubic feet on two consecutive nights potash-deficient tomato plants showed severe symptoms of burning, while healthy plants remained uninjured.

1169. PIZER, N. H., AND DOWNES, W. F. 635.64: 632.19: 546.72
Iron deficiency in glasshouse tomatoes.
Agriculture, 1945, **52**: 120-2.
Striking symptoms of what was shown to be iron deficiency were displayed by glasshouse tomatoes in the Ramsgate, Kent, area in August 1944. Although the plants responded to injections with iron sulphate tablets by an improvement in their leaf colour, the mechanical injury was too severe to make the treatment practicable. Hence, taking advantage of the readiness of the tomato to root from the stem, a 1½-in. layer of moist granulated sedge peat, pH 4, containing ½ oz. iron sulphate per bushel, was placed round the plants after some of the roots had been exposed by scraping down the soil from the ridges. Nine and sixteen days afterwards the plants were watered with a solution of iron sulphate, 1 oz. per gallon. Apart from those plants which had suffered too serious damage in their early development, the treatment resulted in a very marked improvement after 3 weeks, but it was too late in the season to expect economic cropping. It is believed that iron sulphate at 1 oz. per square yard would be sufficient, provided it is dissolved in

1 gal. of water to ensure thorough distribution in the peat.—South-Eastern Agricultural College, Wye.

1170. Walsh, T., and Clarke, E. J. 635.64: 632.19
A chlorosis of tomatoes in relation to potassium and magnesium nutrition.
J. roy. hort. Soc., 1945, **70**: 202-7, bibl. 5.

Detailed reports on the authors' investigations on the premature yellowing of the bottom leaves of tomato plants as a result of magnesium deficiency induced by a high level of potassium nutrition have been published elsewhere: *J. Dep. Agric. Eire*, 1942, 39: 316-25 (*H.A.*, 13: 1429), *ibidem*, 1944, 41: 53-81 (*H.A.*, 14: 1768), *Papers read before R.I.A.*, 12 and 26 June, 1944. The present paper gives a general account of the results obtained. All the analyses of Irish tomato house soils showed that magnesium chlorosis was associated with an extra high quantity of available potash, on the average about 0·1%, frequently to a depth of over 3 feet. Of the two possible methods of restoring the balance between the two nutrients, i.e. the non-application of potash and the raising of the magnesium level by applications of magnesium sulphate, the former has led to a much increased yield due to increased vigour, while the latter has the most undesirable effect of increasing the salt concentration in the soil still further. The control of chlorosis on a high potassium level was found to be accompanied by a considerable decrease in size, yield and quality of fruit and in increased susceptibility to blossom-end rot, resulting from the non-availability of water in a medium of high osmotic pressure. Moreover, root rot attributed to *Colletotrichum atramentarium*, was shown to be caused by salt injury in the first place, the increase in tendency towards injury being correlated with an increase in salt concentration. A comparison of a number of tomato house soils and normal agricultural soils showed that their resistance was in the region of 700-1,000 ohms and 10,000-30,000 ohms respectively. Magnesium deficiency induced by excess of potash was also found in potatoes, mangolds, sugar beet, apples, swedes, tobacco, turnips and to a less extent in cereals.—University College, Dublin.

1171. Green, D. E., and Thomas, C. T. 635.64: 632.411
Note on blight of outdoor tomatoes.
J. roy. hort. Soc., 1945, **70**: 211-4, bibl. 2.

In 1944, small-scale trials were arranged at Wisley and duplicated at the Glamorgan Farm School, Neath, South Wales, in order to obtain information on the number of spray applications required for the control of *Phytophthora infestans*—blight of tomatoes and on the best times to apply them. Blight appeared so late in that year that the plot at Wisley failed to yield any results. But the duplicate trial showed that 2 spray applications are necessary in western areas to protect outdoor tomatoes, the optimum dates for 1944 having been 30 July and 12 August. One spraying during the first week of August is considered sufficient in Surrey. Better control was obtained by colloidal copper than by bordeaux mixture (4-6-50), which was less desirable also in view of the deposit left on the fruit after 2 applications.

1172. Glasscock, H. H., and Ware, W. M. 635.64: 632.48
***Alternaria* blight of tomatoes.**
Agriculture, 1944, **51**: 417-20.

This is the first authentic record of *Alternaria* blight of tomatoes in Great Britain, caused by *A. solani*, the disease having been identified in several places in south and south-east England during the 1944 season. Heavy damage to leaves, stems and fruits of outdoor tomatoes is reported and a description of the symptoms is given. Owing to the lateness of the attack loss of yield was due to fruit rot and fruit drop rather than to the death of the leaves. So far, no suggestion in respect of the source of the outbreak can be made and in the absence of research under British conditions the adoption of control measures as worked out in America is recommended.—South-Eastern Agricultural College, Wye, Kent.

1173. Alexander, L. J., and Tucker, C. M. 635.64: 632.48
Physiologic specialization in the tomato wilt fungus *Fusarium oxysporum* f. *lycopersici*.
J. agric. Res., 1945, **70**: 303-13, bibl. 11, being *J. Ser. Pap. Missouri agric. Exp. Stat.* **897**.

Tomato varieties hitherto regarded as resistant to *Fusarium oxysporum* f. *lycopersici* were found to be susceptible to an isolate of the fungus obtained in Ohio. The inheritance of resistance to the Ohio race in *Lycopersicon pimpinellifolium* is discussed.

1174. Heinze, P. H., and Andrus, C. F. 635.64: 632.48
Apparent localisation of *Fusarium* wilt resistance in the Pan America tomato.
Amer. J. Bot., 1945, **32**: 62-6, bibl. 8.

Approach grafts and splice grafts of the wilt resistant Pan America and the susceptible Bonny Best varieties of tomato plants were made to determine the nature of the resistance in the Pan America tomato plant [to *Fusarium oxysporum* f. *lycopersici*]. Bonny Best scions on Pan America stocks remained free of disease in more than 90% of the cases. Pan America scions on Bonny Best stocks became severely infected in nearly all cases, as did Bonny Best scions on Bonny Best stocks. Bonny Best scions have little or no effect on the resistant properties of the Pan America stock and the Pan America stock does not impart any of its resistant characteristics to the Bonny Best scion [as shown by cuttings]. Stocks and scions of *Lycopersicum pimpinellifolium* plants gave practically the same response as Pan America. The outstanding fact observed is the complete susceptibility of the Pan America scions when supported on a susceptible Bonny Best root system. Resistance to the wilt fungus in tomatoes appears to be localized entirely in the root system of the resistant varieties and is not transportable. [From authors' summary.]—U.S. Southeastern Regional Vegetable Breeding Laboratory, Charleston, S. Carolina.

1175. Reichert, J., and others. 635.64: 632.4
Field trials for the control of tomato leaf diseases.
Palestine J. Bot. (*R*), 1944, **4**: 117-41, bibl. 28.

Of the five tomato leaf diseases selected for study three either failed to appear or were of very little importance during the period of the investigation (1939-41) and only powdery mildew, *Leveillula* (*Oidiopsis*) *taurica* and leaf mould, *Cladosporium fulvum* remained. In view of the very varying conditions prevailing in Palestine the trials were carried out in the moderately warm and very humid coastal plain near Tel Aviv, in the hot and moderately humid Jordan Valley near the exit of the Jordan from the Sea of Tiberias, and in the warm and relatively dry eastern part of the Valley of Esdraelon. Among the chief results obtained were the following:—(1) Powdery mildew was effectively controlled by the lime-sulphur preparations Cita Lime-Sulphur and Sulfinette at 1·5% strength. (2) In addition to these two washes the sodium pentasulphide spray Sulfocide (0·5%), the salicylanide spray Shirlan AG (0·5%), bordeaux mixture (1%)—this resulted in spray injury when applied at frequent intervals—and the cuprous oxide spray Perenox (0·33 or 0·5%)—no spray injury, provided 1% white oil or Aboleum was added—were found to control leaf mould. (3) A very marked increase in yield was obtained by the combined control of powdery mildew and leaf mould, the latter requiring treatment at frequent intervals. Such frequent applications were found to pay in the Jordan Valley, whereas in the coastal plain market prices were the decisive factor. (4) For the control of powdery mildew in the Jordan Valley weekly applications of lime-sulphur starting after the appearance of symptoms seemed to suffice. (5) The Perenox plus oil spray was particularly effective in increasing the percentage of late

fruit, thus prolonging the picking period. In one trial this spray had the additional effect of reducing frost injury to leaves. (6) The application of all spray mixtures tested was found to reduce the number of frost-injured fruits significantly, though the metallic copper component appeared to be especially active in this respect.—Agricultural Research Station, Rehovot.

1176. Gauch, H. G., and Wadleigh, C. H. 635.65: 631.42

Effect of high concentrations of sodium, calcium, chloride, and sulfate on ionic absorption by bean plants.

Soil Sci., 1945, **59**: 139-53, bibl. 33.

Red kidney bean plants were grown to the flowering stage in aerated solution culture with base nutrient solution, and in base nutrient solutions to which various amounts of $CaCl_2$, of NaCl, and of Na_2SO_4 were added. These three salts were added individually to the base nutrient solution in quantities sufficient to raise the osmotic pressure by increments of 1, 2, 3, and 4 atmospheres. The addition of these salts to the base nutrient affected not only the concentration of the ions of the added salt in the plant, but in some cases the uptake of base nutrient ions, as follows: *Calcium.* The addition of $CaCl_2$ to the solution resulted in an increase in the concentration of Ca++ in the leaves, stems and roots, but the increase was by no means proportional to the amounts added. *Sodium.* When NaCl or Na_2SO_4 was added to the solution there was only a very slight increase over the low Na+ concentration which prevailed in the leaves normally, but there was a moderate increase in the concentration of Na+ in the stems. There was, however, a striking increase in the content of Na+ in the roots. *Chloride.* The plants took up considerable quantities of chloride. *Sulphate.* The concentration of sulfate in the roots was very closely paralleled by a similar increase in the leaves. The plants possessed the ability to "exclude" sulfate to a rather marked degree as compared with chloride. *Potassium.* Concentrations of K+ in the leaves were inversely related to the trends for Ca++ concentrations in the leaves in the $CaCl_2$ series. In the roots, the higher concentrations of K+ were associated with the lower concentrations of *other* cations ($CaCl_2$ series); and the lower concentrations of K+ in the roots were associated with the higher content of *other* cations (Na_2SO_4 series). *Phosphate.* The addition of salt to the base nutrient solution, regardless of the types of salt or concentrations employed, had very little effect on phosphate concentrations in the plant parts. *Total nitrogen.* Increasing amounts of the three salts tended to decrease progressively the concentration of total nitrogen in the plant tissues, but this effect was attributed to season of the year. The data reported herein tend to corroborate the evidence that salt absorption involves an extremely complex series of interrelated processes. [From authors' summary.]

1177. Davis, J. F. 635.65: 581.145.2

The effect of some environmental factors on the set of pods and yield of white pea beans.

J. agric. Res., 1945, **70**: 237-49, bibl. 2, being *J. Art. Mich. agric. Exp. Stat.* **671**.

Of the environmental factors studied maximum temperature was found to influence the set of pods in beans (*Phaseolus vulgaris*) more than any other. An equation has been worked out which indicates that under Michigan conditions approximately 57% of the blossoms will set pods, if the average maximum temperature for any two successive days during the blooming period does not exceed 75° F. For each degree of temperature above 75° a reduction of approximately 2% in the set of pods will result. The error for any single predicted value is 7·6% of the mean, which must be regarded as satisfactory in view of the fact that temperature is only one of the factors involved. Minimum relative humidity and soil moisture did not reach a critical value during the experiment and exerted only a minor influence on the set of pods. The relation of leaf area to yield was determined by the weather prevailing during the blooming period. About 87% of all white pea beans in the U.S. are grown in Michigan, almost entirely in 19 counties of the east-central part. It is suggested that the method adopted in this investigation may be applicable to other crops with critical environmental requirements in determining the suitability of a particular area for their production.

1178. Owen, E. C., Snow, D., and Thom, C. L. 635.65: 631.811.9: 546.27

The effect of borax dressings on the growth and yield of field beans (*Vicia faba* L.).

J. agric. Sci., 1945, **35**: 119-22, bibl. 14.

Plot experiments showed that borax dressings at the rate of 12-100 lb. per acre caused temporary yellowing of field bean seedlings and that borax applications of 25 lb. or more had a depressing effect on stand and yield. In view of the fact that basal fertilizers contain boron impurities in sufficient amounts, it is considered inadvisable to apply boron to beans separately. The distribution of boron within the treated plants and the boron uptake from the soil at different levels of boron were determined.—Hannah Dairy Research Institute, Kirkhill, Ayr.

1179. Löbbe, H. 635.652

Os feijões Mulatinho e Preto. (The dwarf kidney beans Mulatinho and Preto in Brazil.)

Publ. Serv. Inform. agric. Rio de J. (*S.I.A.*) **202**, 1942, 2nd edition, pp. 29.

The cultivation, marketing, etc., of two popular Brazilian varieties of French bean, Mulatinho (Mulatto) and Preto (Negro) is described.

1180. Wene, G., and Hansberry, R. 635.65: 632.76

Toxicity of cryolite to Mexican bean beetle larvae.

J. econ. Ent., 1944, **37**: 656-9, bibl. 4.

In laboratory cage tests cryolite sprays were shown to be highly toxic to the Mexican bean beetle, although slow acting. The susceptibility of the different larval stages to the chemical is discussed.

1181. Home-Grown Threshed Peas Joint Committee. 635.656

Harvesting peas on four-poles.

Agriculture, 1945, **52**: 158-9.*

The setting up of four-poles for drying peas after cutting is pictured and the piling of the crop is described. The right condition for putting the peas on the four-poles, viz. when most of the sap has dried out, will normally be attained in 3-4 days after cutting, possibly after turning once. The crop must be free from atmospheric moisture when piled.

1182. Leach, L. D., and Smith, P. G. 635.656: 631.531.17

Effect of seed treatment on protection, rate of emergence, and growth of garden peas.

Phytopathology, 1945, **35**: 191-206, bibl. 23.

At the California Agricultural Experiment Station, Davis, in a soil artificially infected with *Pythium ultimum* the commercial preparations Semesan and Yellow Cuprocide gave slightly better control than Arasan, New Improved Ceresan, or Spergon on garden peas. All five preparations were far superior to the non-treated control. Dichloronaphthoquinone in a single trial was highly protective. None of the treatments controlled post-emergence epicotyl infection or cotyledon decay. In field trials, where infections principally of *Pythium* were light, Spergon and Semesan produced less injury and therefore better results than Yellow Cuprocide or New Improved Ceresan. Yellow Cuprocide reduced rate of emergence and growth at low but not at high or moderate temperatures. The cause of the slight reduction

* The note may be obtained in leaflet form from 45 Bedford Square, London, W.C.1.

of emergence in one trial with New Improved Ceresan as compared with Spergon or Semesan, whether from a lower protective value or from mild injury, could not be determined. Yellow Cuprocide and Semesan each delayed absorption from the cotyledons of Laxton's Progress, causing slight cotyledon necrosis, but Semesan did not reduce seedling growth or yield of mature plants. With Yellow Cuprocide the seedling weight and crop yield per plant was reduced. Any benefits produced by these treatments were entirely due to disease prevention.

1183. Dudley, J. E., Jr., and Bronson, T. E. 635.656: 632.753
Strength of rotenone dust mixtures and rate of application in pea aphid control.
J. econ. Ent., 1944, **37**: 643-6, bibl. 1.
There was little difference in pea aphid kills between an oil-conditioned rotenone-bearing dust mixture of high rotenone content applied at a low rate and a mixture of low rotenone content applied at a higher rate, provided the dosage per acre amounted to not less than 0·30 lb. Applied at the rate of 0·15 lb. per acre a dust mixture of high rotenone content was found to give better control.

1184. Mather, K. 635.67
What is hybrid sweet corn ?
What varieties of sweet corn are profitable ?
How early can sweet corn be sown ?
John Innes Bull. **1**, 1945, pp. 32-4, 35-7, 38-9.
Notes on how hybrid sweet corn is produced, on the results of a variety trial at Merton in 1944, and on the dates at which it is advisable to sow in Southern England.

1185. Antill, R. M. 633.71
(15) **A history of the native grown tobacco industry of Nyasaland.**
Nyasaland agric. Quart. J., 1945, **5**: 49-65, bibl. 5.

Bawden, F. C., and Kassanis, B. 632.8
The suppression of one plant virus by another.
Ann. appl. Biol., 1945, **32**: 52-7, bibl. 11.
Potato viruses.

Blaser, H. W. 633.913
Anatomy of *Cryptostegia grandiflora* with special reference to the latex system.
Amer. J. Bot., 1945, **32**: 135-41, bibl. 15.

Cook, R. P., and Tulloch, W. J. 635.656: 633.88
Green pea juice as a medium for the production of penicillin.
Nature, 1945, **155**: 515, bibl. 3.

Dieter, C. E., and others. 635.656: 632.753
Laboratory technique for testing insecticidal dusts for pea aphid control.
J. econ. Ent., 1944, **37**: 646-51, bibl. 1.

Fernandes e Silva, R. 633.85
O girassol, sua cultura e importância econômica. **(Cultivation and economic importance of the sunflower.)**
Publ. Serv. Inform. agric. Rio de J. (*S.I.A.*) **550**, 1944, 3rd edition, pp. 13, bibl. 5.

Frazier, J. C. 632.51
Nature and rate of development of root system of *Gonolobus laevis* [a noxious perennial weed of central U.S.A.].
Bot. Gaz., 1945, **106**: 324-32, bibl. 10.

Granovsky, A. A. 633.491-2.6/7
Tests of DDT for the control of potato insects.
J. econ. Ent., 1944, **37**: 493-9.

Kefford, J. F. 635.65: 664.84.65.036.5
White and Pinto bean varieties for canning [in Australia].
Food Pres. Quart., 1944, **4**: 22.

Lubatti, O. F. 632.944
Sorption of fumigants.
Nature, 1945, **155**: 577, bibl. 7.

Miller, J. H., Burton, M. G., and Manning, T. 633.52
A statistical study of the relations between flax fiber numbers and diameters and sizes of stems.
J. agric. Res., 1945, **70**: 269-81, bibl. 8, being *J.Pap. Ga agric. Exp. Stat.* **116**.

Putt, E. D. 633.85
Histological observation on the location of pigments in the akene wall of the sunflower (*Helianthus annuus* L.).
Sci. Agric., 1944, **25**: 185-8, bibl. 5.

Reichert, J. 635.8
Studies on mushrooms and other fungi of the forests of Palestine. III. An edible forest truffle [*Delastriopsis oligosperma*], its taxonomy and geography.
Palestine J. Bot. (*R*), 1944, **4**: 193-204, bibl. 14.

Swingle, M. C., and Mayer, E. L. 632.951
Further tests of synthetic organic compounds as insecticides [against a number of truck crop insects].
J. econ. Ent., 1944, **37**: 843-4, bibl. 3.

Wade, B. L., and others. 635.65: 577.16
Inheritance of ascorbic acid content in snap beans.
J. agric. Res., 1945, **70**: 170-3, bibl. 3.

FLOWER GROWING.

1186. Bornás y de Urcullu, G. 635.1/9(46)
Floricultura. **(Floriculture in Spain.)**
Publ. Minist. Agric. Madrid, 1942, pp. 160.
The Spanish Ministry of Agriculture issued this booklet from a desire to further commercial floriculture in that country. They suggest a cautious beginning, confined to popular sorts and a few varieties only of each kind. Care should be taken to ensure that the soil and climate are suited to the varieties selected. There is also a future for garden plants and shrubs. The possibilities of the trade and suggestions as to localities occupy the first 20 pages, the remainder are devoted to practical advice both general and with special reference to carnations, roses, chrysanthemums and dahlias, various bulbs under glass and in the open, and as pot plants cyclamen, calceolaria and cineraria. A few pages deal with growing for seed.

1187. Bornás y de Urcullu, G. 634/635(46)
Jardines. **(Gardens.)**
Publ. Minist. Agric. Madrid, 1943 (?), pp. 126, 2 pesetas.
Instruction for the laying out, planting and managing of small private gardens in Spain.

1188. Mariat, F. 585.94: 577.16: 581.142
Influence favorable de la vitamine B_1 sur les germinations de *Cattleya*. **(Favourable influence of vitamin B_1 on the germination of *Cattleya* orchids.)**
Rev. hort. Paris, 1944, **116**: 68-9, bibl. 2.
Seeds of *Cattleya* orchid were germinated in asymbiotic jellied and sugared Knop solution to which vitamin B_1 2·60 mg. per litre had and had not been added. Germina-

tion was equally good in all cases but the seedlings in the tubes containing the vitamin B_1 went ahead and in 3 months 42% of the embryos had produced leaves, against only 3% of those not receiving the vitamins.

1189. CROSSLEY, J. H. 635.944
Promising new methods used in propagation of hyacinths.
Sci. Agric., 1944, **25**: 169-74, bibl. 9.
The three methods of hyacinth propagation discussed in this paper, which was read before the Canadian Society of Technical Agriculturists at Toronto in June 1944, are (1) the Saanichton system developed at the Dominion Experimental Station, Saanichton, B.C., (2) the production of hyacinth bulbs from discarded basal plates and (3) scaling the bulbs after incubation. (1) The chief advantage of the Saanichton system is that it omits the dry period of callusing, starting incubation in containers with moist sphagnum peat moss immediately after the bulbs are cut. Certain devices for maintaining a desirable level of humidity and an incubation cabinet heated with a 100-watt Mazda lamp and fitted with an electric fan and a thermostat are described. The controlled temperature cabinet may be substituted by a greenhouse propagating frame or some other expedient. The system shortens the period required for bulb production as compared with the standard method and reduces the number of routine inspections. (2) Basal plates, which are obtained from scooped bulbs, are placed in a container with moist peat in a greenhouse propagating frame. The plates are planted out in November. The method is very satisfactory for the production of large bulbs, though the number of bulbs is small as compared with the scoring practice. (3) Each bulblet is removed with a piece of the parent scale attached after incubation is completed. The bulblets are planted in flats containing a lower layer of compost and an upper layer of sand. The base of the bulblet rests on the sand just above the compost, the tops being covered with 1½ in. of sand. The flats are kept in a basement at a temperature of 10-15° C. until top growth appears, usually after the New Year. After one season's growth in the flats the ripened bulblets are reset in the ground. One year is claimed to be gained by this procedure.—Dominion Experimental Station, Saanichton, B.C.

1190. WADE, G. C. 635.944: 632.482
The control of *Botrytis* corm rot of the gladiolus.
J. Dep. Agric. Vict., 1945, **43**: 127-30, bibl. 4.
A brief account of an investigation on *Botrytis* corm rot of the gladiolus first recorded in Victoria in 1940. The full report will be published elsewhere. The preventive and control measures suggested include the following recommendations: (1) Dip the corms, as soon after digging as possible, for 15 minutes in Hortosan DP (2 oz. in 10 gal.) or in Zetan (1 lb. in 10 gal.). Before dipping, the corms should be washed with a water spray. Tentative suggestions for restoring the original strength of the solution after treatment are given. (2) Burn or bury infected corms and unwanted flowers in the field. (3) Dig early, as the fungus is favoured by moist conditions. (4) If any of the listed, resistant varieties are grown, dipping is unnecessary. (5) Control measures against foliage infection are usually not considered necessary.

1191. CREAGER, D. B. 635.944: 632.4
Rhizoctonia neck rot of gladioli.
Phytopathology, 1945, **35**: 230-2.
A destructive disease of the commercial gladiolus-growing area of Illinois, of which *Rhizoctonia solani* is here shown to be the pathogen.

1192. CREAGER, D. B. 635.9: 632.8
Mosaic of the common coleus.
Phytopathology, 1945, **35**: 223-9, bibl. 7.
Shown by grafting to be a transmissible virus. Vector unknown. Could not be transmitted mechanically.

CITRUS AND SUB-TROPICALS.

1193. HODGSON, R. W. 634.1/8(611+64+65)
The fruit growing industries and possibilities of French North Africa.
Yearb. Calif. Avocado Soc. 1943, 1944, pp. 60-2.
The author points out that French North Africa is already one of the great fruitgrowing regions of the world with many similarities between its industries and those of California. Much more irrigation is needed and will be difficult owing to lack of water in Tunisia but not so difficult in Algeria and Morocco. Control is essential of the Mediterranean fruit fly (*Ceratitis capitata*), which remains a scourge.

1194. ALGERIA. 634.1/8(65)
Comptes rendus de l'expérimentation fruitière en Algérie, année 1941. **(Report on fruit investigations in Algeria in 1941.)***
Bull. Inspec. gén. Agric. algér. **75**, 1942 (?), pp. 35, bibls.
Boufarik Citrus Station. Time of maturity tests and flowering dates were observed for a number of popular orange varieties. Date of maturity for a given variety was influenced by site, age and cultivation factors. Trees in poor condition ripened their fruit earlier than healthy trees. Control of irrigation based on fruit growth measurements proved reliable and suitable for growers. The fruit of adequately irrigated trees maintains a regular rate of size increase; if the fruit growth becomes irregular, the irrigation is probably at fault. Pecans planted in 1930, both seedling and grafted varieties, have grown and fruited well on heavy moist soil. The frequent low yields of the Clementine oranges are disquieting. It appears from investigations carried out at the station, that partial defoliation by wind, which regularly occurs in winter or spring, leads to bud drop from lack of nutrition. Another cause is faulty irrigation in March-April. At this time many orchards, while appearing well supplied with moisture at the surface, are too dry at 30 to 40 cm. below, and at this season transpiration through wind and sun is heavy. The theory of self-incompatibility of pollen is discounted. Many isolated Clementine groves fruit quite well, while Clementines in mixed orchards are often nearly sterile, especially during the first 12 years. Lack of balance in nutrition is probably the reason for poor yielding, the trees run to foliage rather than fruit. As they age equilibrium is acquired, the trees alter in appearance and begin to bear, though the yield may be reduced by other factors. At Boufarik the ringing of a practically non-bearing 10-year-old tree by the removal of 3 mm. width of bark around two-thirds of the trunk circumference was followed by a crop of 49 kg. A complete ring 8 mm. wide round a large branch of another tree resulted in this being the only branch to bear, but the ring failed to heal over for 2 or more years and the branch became chlorotic. Further instances were noted in which moderate ringing greatly increased yield and, finally, half the trees in the orchard were ringed, resulting in an increase of 66% over the unringed half. These good results lasted several years without further treatment. Ringing is only suitable for trees in luxuriant growth. It has no effect on trees not bearing through ill-health. *Bougie.* Drying and sulphuring experiments with 4 varieties of fig resulted in Tameriout giving a better product than Dottato, Verdale and Smyrna. Tameriout can be allowed to hang on the trees till semi-dried, the others are too watery and inclined to ferment in the climate of the Station. There is a high water table and heavy soil at this station and fruit trees are apt to die off

* For report on work in 1942, received earlier, see ***H.A.***, 14: 2016.

from root rot. Of oranges Jaffa seems most resistant and 10-year-old Clementines fruited well, possibly because the soil conditions curb their luxuriance of foliage. *Miliana.* The report consists solely of observations on the characters of the many varieties grown. *Hamma.* Avocado. The fruit is on the tree at the seasons when the weather is most inclement and suffers accordingly. The Guatemalan type with its thick skin is the best kind for transport but is less frost-resistant than the Mexican types. Transplanting experiments were carried out with pecan, pistache and avocado, being species which are not easy to propagate and have a relatively heavy mortality on planting out. *Orléansville.* Work for 1942 will be concerned with irrigation of citrus, the shade drying and the pruning of Dottata fig. *Ferme-blanche.* Draining and subsoiling completely restored to health an old mandarin plantation which was suffering badly from excess of soil moisture and salt. *Barral.* Yield of orange trees seems to be closely bound up with adequate irrigation. *Msila.* The non-irrigated olive groves yielded better than those receiving water, for causes which are to be investigated. Reports from the remaining Experiment Stations are of but slight interest. The Report ends with a series of observations made on fruit trees growing in a number of private orchards.

1195. Frost, H. B. 634.3-1.52
What citrus varieties should I plant ?
Calif. Citrogr., 1945, **30**: 133, 152-3, bibl. 3.
The prospects of a number of new citrus varieties are discussed. So far none of them have been shown to be profitable for commercial planting anywhere in California, though some of them are useful for home planting. Local environment has a marked influence on flavour and yield.

1196. Sip, I. 634.3
Citrus amidst snows. [Russian.]
Socialističeskoe Zemledelie (Socialist Agriculture), 1944, No. 253, p. 2.
In this article the 50th anniversary of the Soci Experimental Station of Subtropical and Southern Horticulture is commemorated. This station is the northernmost outpost of the sub-tropics, being situated on the Black Sea shore of the Krasnodar Territory. Although heavy snowfalls occur frequently in winter, lemons, grapefruit, mandarins, and oranges have been acclimatized well and are grown on hundreds of hectares. There are also small plantations of mandarins at the Lazareoskaja settlement, 50 km. farther north; and at Tuapse, 150 km. northwards of Soci, there are citrus groves. Work on citrus in the last 10-15 years has been done by the staff of this station.

1197. Bathurst, A. C. 634.31-1.855
The effects of superphosphate on orange trees.
Fmg S. Afr., 1945, **20**: 351-3, bibl. 3.
The results of tests carried out in most of the citrus growing areas of the Union indicate that applications of superphosphate will cause a decrease in skin thickness and a reduction in the acidity of the juice. In one instance, in the Rustenburg area, mottling of the trees was observed as a result of applying this fertilizer. In this case, apparently an overdose of superphosphate had interfered with the zinc nutrition of the trees, and the trouble was controlled by applications of zinc citrate. Three to seven pounds of superphosphate, well forked into the soil, is the cure recommended for thick-skinned and acid fruit, especially in the eastern Transvaal, provided no mottling is evident. Kraal manure and compost will also help to increase the phosphate content of the tree.

1198. Finch, A. H. 634.323-1.8
The summer handling of desert grapefruit orchards.
Calif. Citrogr., 1945, **30**: 210-2.
External quality or skin thickness and texture and shape of fruit of Arizona desert grapefruit are influenced by moisture relations and by the percentage of nitrogen in the tree. Internal quality and time of colouring are influenced chiefly by the nitrogen in the tree and by temperature. Moisture conditions have little effect. The fruit requires plenty of moisture while it is swelling. The first 6 ft. of soil should be regarded as a reservoir of water and this cannot be adequately maintained by furrow irrigation. Refilling should be done before the fruit becomes stringy, for, though it will resume turgidity after watering, there are indications that the quality will be impaired if water is withdrawn from the fruit for the leaves to transpire. If the nitrogen level in the leaves drops from 2·2% or more in early summer to 1·2% by late September under common moisture irrigation conditions, the fruit will colour and attain a 6-1 ratio earlier and will have a lower acid through the hottest season and will maintain its condition somewhat longer the next summer. The declining nitrogen content can be brought about by careful application of nitrogen in winter, so that as little as possible would remain in the soil, by encouraging summer growth of weeds and by not discing them in till October. At the Arizona University Experimental Farm the use of permanent grass covers has shown promise as a method of economically handling the orchards and effecting the desired nitrogen levels. The permanent grass is cut and removed from the orchard for 5 dollars an acre, being the entire cultural cost for a year.

1199. Levitt, E. C. 634.3-1.459
The " scorched earth " policy in coastal citrus areas.
Agric. Gaz. N.S.W., 1945, **56**: 63-4.
Growers in the newly cleared Mangrove Mountain and Kulnura districts, New South Wales, are criticized for disregarding the necessity of leaving timber belts as wind breaks and of contour planting. The vital need for new settlers to adopt these fundamental practices is strongly emphasized.

1200. Halma, F. F., Smoyer, K. M., and Schwalm, H. W. 634.3-1.541.11
Rootstock in relation to quick decline of citrus.
Calif. Citrogr., 1945, **30**: 150-1, bibl. 2.
Data are produced to show that the disease of Navel and Valencia oranges in California known as quick decline is confined to those on sour orange stock, so far as is at present known. The article is mainly confined to describing methods of determining the rootstocks of established orchards. 1. *Rootstock sprouts.* Dependable and rapid provided the sprouts can be induced to emerge. Sprouts a little distance from the trunk should be traced back to the root since they may be mixed up with volunteer seedlings. 2. *Type of bud union.* Sour stock is liable to develop overgrowth of the scion at point of bud union. On sweet orange stock the union is relatively smooth. The bud unions of trees on grapefruit stocks are smooth or undergrown, that is the stock trunk is larger than that of the scion. Trifoliate stocks have a pronounced undergrown bud union and fluted stock stems, but are often budded so low as to be difficult to determine, and, to increase the risk of confusion, it was found that many young trees on sour stock are at first undergrown at the bud union. However, experienced observers can make limited use of this method. 3. *The chemical method.* An empirical procedure, the chemistry of which is unknown. A boat-shaped strip of bark 2½ in. × ¾in. is cut from the trunk below bud union, cleaned of dirt, dried, and ground to pass through a 40-mesh sieve. One half gram of this powder is mixed with 15 c.c. of distilled water, transferred to a rapid filter and the residue washed with 5 c.cm. of water. Five c.cm. of the filtrate is transferred to a test tube; 1 drop of potassium hydroxide is added, followed by 3 drops of a saturated solution of copper sulphate and 3 drops of mercury reagent. The reagent is made up of 160 g. redistilled mercury dissolved in 160 g. of red fuming nitric acid (s.g. 1·60) and diluted with 320 c.c. of distilled water. The reagent gradually

loses strength and requires frequent testing. After adding the reagent the contents of the test tube are boiled for a few seconds, the resulting colours of the solution identifying the species. Thus sour orange solution becomes amber, sweet orange dark pink. Grapefruit has a wider range, but seems intermediate in colour between sour and sweet. Eureka lemon, though not used as a stock, gives a reddish colour. [For colorimetric tests of citrus see Halma and Haas, *Plant Physiol.*, 1929, 4: 265-8 and Marloth, *J. Pomol.*, 1936, 14: 1-8; *H.A.*, 6: 360.—Ed.]

1201. Provan, J. L., and Cole, C. E. 634.31-1.541.11
A progress report on the citrus rootstock trial at Irymple.
J. Dep. Agric. Vict., 1944, **42**: 537-40.
An account of some results from a 6-acre rootstock trial with orange trees established by the Department of Agriculture in the Mildura irrigation district, Victoria, in 1934. The trial comprises 180 Washington Navel and Valencia Late orange trees on sweet orange (*Citrus sinensis*), sour orange (*C. aurantium*) and citronelle (=rough lemon, *C. limonia*) rootstocks, 30 trees of each stock-scion combination. After 10 years it is evident that under the conditions of the experiment sweet orange is superior to the two other rootstocks with regard to size, shape and uniformity of tree as well as with regard to fruit quality and yield. The results suggest that in Victoria sweet orange can be generally recommended for use as a rootstock.

1202. Chapman, H. D., Brown, S. M., and Rayner, D. S. 634.3-2.19
Nutrient deficiencies of citrus.
Calif. Citrogr., 1945, **30**: 162-3, 198-2, 216-7.
A general outline of the mineral requirements of citrus together with a discussion on iron, manganese, zinc and copper deficiencies in California by workers at the Citrus Experiment Station, Riverside. Ways of distinguishing the deficiencies from each other are described and the best methods of restoring the trees to health.

1203. Roy, W. R. 634.31-2.19-1.83
Effect of potassium deficiency and of potassium derived from different sources on the composition of the juice of Valencia oranges.
J. agric. Res., 1945, **70**: 143-69, bibl. 52.
This study of the progressive changes in some biochemical characteristics of orange juice as influenced by different levels and different sources of potash was carried out at Orlando, Fla. The critical level of potash fertilization, i.e. the level beyond which yield and fruit quality was not improved by higher potash applications, was determined as an annual dose of 1·7-2·3 lb. per tree. The following changes in the composition of the juice were found to result from potash deficiency induced by withholding this nutrient for 5-5½ years: (1) An increased concentration of (*a*) reducing sugars, (*b*) total sugars; (2) a decreased concentration of citric acid; (3) a decrease in (*a*) the buffer index, (*b*) the pH value, (*c*) the percentages of ash and potassium, (*d*) the alkalinity of the ash; (4) an increase of the ratio of reducing to non-reducing-sugars. In confirmation of previous work done in Florida (*Proc. Fla St. hort. Soc. for 1940*, 1940, pp. 38-46; *H.A.*, 11: 862) it was found that potassium deficiency was associated with a 2-3-weeks' earlier onset of legal maturity (solids-acid ratio in the juice of 8: 1). Muriate of potash, sulphate of potash and sulphate of potash-magnesia proved of equal value as sources of potassium.

1204. Parker, E. R., Persing, C. O., and Moore, E. C. 634.3-2.19: 546.47
How to apply zinc spray for mottle-leaf control.
Calif. Citrogr., 1945, **30**: 200-1.
With special reference to the use of the spray duster. The suggested formulas are per acre: (1) for mottle leaf correction on citrus, 25 lb. zinc sulphate, 12·5 lb. soda ash, 100 gal. water; (2) for maintenance of zinc supply 15 lb. zinc sulphate, 7·5 lb. soda ash, 100 gal. water. Separate zinc treatments are, for reasons discussed, more economical of material than the inclusion of the zinc in full coverage lime-sulphur sprays, as is so often done. The saving resulting from the use of separate sprays amounts to from 5 to 15 dollars per acre.

1205. Herrero Egaña, M., and Acerete Lavilla, A. 634.31-2.111
Las heladas en la produccion naranjera. **(Frost and orange growing.)**
Publ. Minist. Agric. Madrid, undated (1942 or 1943), pp. 103, bibl. 43.
This for its size is a very complete, short account of frost damage in orange orchards, the methods which have been tried successfully and unsuccessfully to combat it, and the effects on the fruit.

1206. Nadel, M. 634.31-2.4
Anatomical study of the button of Shamouti oranges in relation to stem-end rot.
Palestine J. Bot. (*R*), 1944, **4**: 166-70, bibl. 9.
Sections of the button area of Shamouti oranges never revealed the presence of any mycelium in the inner tissues of newly picked fruit. Mycelium believed to belong to the fungi which cause stem-end rot (*Diplodia natalensis*, *Alternaria* sp., *Colletotrichum gloeosporioides*) was, however, found in the axil of sepals both within the necrotic tissue at the point where petals and stamens are inserted, and more superficially. Although the occurrence of mycelium in the button was always accompanied by a cork layer, formed in response to infection (as well as to mechanical injury) and separating the healthy from the necrotic tissue, such an external infection must be regarded as a potential source of stem-end rot in storage.—Agricultural Research Station, Rehovot.

1207. Minz, G., and Ben-Meir, Y. 634.3-2.4
Pathogenicity of *Diplodia* from various hosts to citrus fruits.
Palestine J. Bot. (*R*), 1944, **4**: 162-5, bibl. 1.
Large-scale inoculation trials in the laboratory proved that *Diplodia natalensis* spores from all citrus hosts and from all hosts outside the genus *Citrus*, with the exception of date palm, *Mentha piperita* and *Pyrus syriaca*, may cause stem-end rot in oranges. Grapefruit and lemon fruits proved susceptible to *Diplodia* from castor beans and *Acacia farnesiana* as well as from all *Citrus* species.—Agricultural Research Station, Rehovot.

1208. Rajan, M. R. D., and Aiyappa, K. M. 634.31-2.411
Leaf-fall and fruit rot disease of oranges.
Ind. Fmg, 1944, **5**: 512-3.
A description is given of the leaf-fall and fruit-rot disease of oranges caused by *Phytophthora palmivora*, which is present in half the Coorg orange area and becomes suddenly manifest with the onset of the monsoon at the end of May or early in June. The affected leaves and fruits are shed emitting a foul odour. Trials in different parts of the province showed that spraying with 1% bordeaux mixture in late May will prevent the outbreak of the disease. If symptoms appear after the monsoon the treatment should be repeated at once. Spraying during the height of the monsoon has no immediate effect, but it may help infested trees to flush out luxuriantly after the monsoon. Sanitary measures are suggested and the financial profit from spraying is worked out.—Orange Research Scheme, Coorg.

1209. Bliss, D. E. 634.3-2.4
Controlling *Armillaria* root rot in citrus.
Calif. Citrogr., 1945, **30**: 130-1, 154-5.
Practical suggestions are made for controlling *Armillaria* root rot of citrus, a disease which is causing some concern in southern California. The nature of this parasitic fungus growth is described. The rate of spread in infected orchards is about one tree row every two years. Trees should be

surveyed annually for signs of attack. The method of doing this is described. In planting, if clean land cannot be used, methods of eradication should be employed beforehand. Small areas can be treated with carbon bisulphide (CS_2) after removal of the infected trees and as many of the roots as possible, including all roots over 2 in. in diameter. The soil is levelled and allowed to dry and the CS_2 is then applied over the entire tree square or to the skirts of adjoining trees at the rate of 2 liquid oz. every 18 inches in rows 18 in. apart to a depth of 8 in. in sandy soil and 6 in. in heavy clay loam. Four depth charges of 6 liquid oz. each are also inserted 4 ft. apart and 4 to 6 feet deep on the former site of the tree by means of a soil tube. The soil is at once tamped over each charge. The treated area is watered to a depth of 3 in. to retain the gas and the wet blanket is maintained for 3 weeks. Canvas or glue-coated paper may be substituted for water. Retention of the gas is important. Replant when all odour of gas has gone from the soil. A self-measuring force-feed type of hand applicator has been developed which renders the task speedy and effective. Directions are given for handling the chemical. Where many trees are infected together a chemical trench barrier round the affected area is recommended to be used in combination with soil disinfection. In the chemical trench CS_2 is applied at the rate of 2 liquid oz. every 18 in. and in holes 8 in. deep. The trench is refilled with the soil removed in excavation and is tamped but not watered. CS_2 is then applied along the top of the filled trench at the same rate, distance and depth, tamped and watered to a depth of 3 in. and a distance of 2 ft. on each side of the trench. The surface treatment is repeated above the trench every 6 months.

1210. Fulton, R. A., and Busbey, R. L. 634.3-2.944
Effect of soils, cover crops, and foliage on concentration of HCN in citrus fumigation.
J. econ. Ent., 1944, **37**: 597-8, bibl. 1.

The loss of HCN gas due to sorption by soils, cover crops and tree foliage in citrus fumigation was found to be negligible as compared with the initial loss through the tent fabric.

1211. Ebeling, W. 634.3-2.752-2.951
Summary of field experiments with DDT and rotenone used in red scale control.
Calif. Citrogr., 1945, **30**: 164, 193, bibl. 1.

DDT. The addition of 4 g. of DDT to 100 ml. of light medium spray oil increased the effectiveness of the oil, especially in spring and summer, against red scale on citrus. Three per cent. kerosene containing 4% DDT was never as effective as 1¾% light medium or heavy medium spray oil, but promising results were obtained by increasing the DDT in the kerosene by means of natural solvents or spraying twice a year with 0·3% kerosene DDT solution. Kerosene does not accentuate water spot of navel oranges as does regular oil spray. A 5% DDT dust at the rate of 1½ lb. per tree was ineffective. The most that can be said for DDT against red scale is that it shows some promise. In all orchards in which DDT was used there was an increase in red mite population and on occasion of citrus aphids, both of which were quite well controlled by oil alone. DDT caused no injury to trees. *Rotenone.* Although the addition of derris or cubé root to oil sprays increased the kill of red scale at the time, it did not necessarily result in improved red scale control when considered from the standpoint of the degree of infestation of sprayed trees after a generation of red scale had been allowed to develop. The addition of cubé root to DDT kerosene spray decreased the long-term effectiveness 5 times out of 6, a paradoxical effect which is not understood.

1212. Cressman, A. W. 632.752
Variations in the susceptibility of California red scale to oil sprays.
J. econ. Ent., 1944, **37**: 851, bibl. 1.

It is shown that the differences in mortality of California red scale observed after field sprays or after laboratory sprays applied to scales collected in the field, are not due to differences in genetical constitution.

1213. Cressman, A. W., and Broadbent, B. M. 634.3-2.752
Changes in California red scale populations following sprays of oils with and without derris resins.
J. econ. Ent., 1944, **37**: 809-13, bibl. 8.

The effect of different spray mixtures upon California red scale populations on lemon trees 6-12 months after application was determined. There was no difference between the immediate and residual effectiveness of a light medium and a heavy medium oil, but the addition of 1·1% derris or cubé resins (0·3% rotenone) to either of the oils was found to reduce scale infestation by about 57% as compared with applications of the oils alone. From statistical observations it is concluded that benefit from the use of derris is most likely to be expected when conditions favour the increase of the pest.

1214. Osburn, M. R., and Mathis, W. 634.3-2.654.2
Effect of cultural practices on the citrus rust mite.
J. econ. Ent., 1944, **37**: 767-70.

In order to test the widely-held opinion that clean cultivation favours the citrus rust mite, *Phyllocoptes oleivorus*, the size of the pest population on orange trees in clean cultivated and cover-crop plots was compared in St. Lucie County, Fla. The results showed that citrus rust mite infestations were not affected by cultural practice, but that the Florida red scale, *Chrysomphalus aonidum*, was less abundant in cover-crop areas.

1215. Persing, C. O. 634.3-2.73
Citrus thrips control.
Calif. Citrogr., 1945, **30**: 144.

Suggestions for citrus thrips control under wartime conditions and shortage of material for oranges and lemons in resistant and non-resistant areas.

1216. Barnes, H., and Wills, J. M. 588.427(943)
Passion fruit growing in Queensland.
Qd agric. J., 1945, **60**: 17-41.

Passion fruit being in constant demand and the sub-tropical coastal areas of Queensland being climatically suited to its cultivation, the industry should have excellent prospects. Old banana plantations, which because of altitude are not easily accessible to dairy stock, are the land the authors think of in the first place. Where the ground allows of mechanical cultivation prospective growers are advised to begin with 4-5 acres of vines, the maximum area one man can attend to (2-3 acres in the case of hand cultivation). The article gives a competent and detailed description of all aspects of passion fruit growing, including the erection and extension of trellis, propagation, replanting, harvesting and packing. The crop is not liable to insect attacks, and brown spot and woodiness are the only serious fungus and virus diseases respectively, which are more fully dealt with in a pamphlet issued by the Department of Agriculture and Stock. Only the purple-fruited *Passiflora edulis* is grown commercially.

1217. McIlhenny, E. A. 633.584.5
Bamboo growing for the South.
Nat. hort. Mag., 1945, **24**: 1-6 and
Bamboo—a must for the South.
Nat. hort. Mag., 1945, **24**: 120-5.

In the first article the author describes the cultivation of bamboos of the *Phyllostachys* group in Louisiana. The *Dendrocalamus* group cannot stand cold. He considers that bamboo will take the place of Southern Pine for paper production, since a bamboo forest scientifically managed —as outlined here—will produce more pulpwood per acre per year than any other plant known. In the second article an account is given of the economic uses of the bamboo. Most of the bamboo used in the U.S.A. before the war was

imported, but it is suggested that plantings of bamboo should now be made on all farms in the South. A rich, well-drained soil is desirable and the temperature should not fall below 15° F.

1218. HODGSON, R. W. 634.653-2.1
Observations on the history and status of the avocado tree decline and collapse problem in California.
Yearb. Calif. Avocado Soc. 1943, 1944, pp. 27-9.
Observations indicate that the marked decline and collapse of the avocado in certain localities is associated with soil conditions and that the phenomena noted are primarily due to excess moisture in the soil.

1219. KLOTZ, L. J., AND SOKOLOFF, V. P. 634.653-2.1
The possible relationships of soil organisms to avocado tree decline and collapse.
Yearb. Calif. Avocado Soc. 1943, 1944, pp. 30-3.
The authors' observations and experiments support the view that although *Phytophthora cinnamomi* is generally present and partially responsible for avocado collapse, it is only capable of doing serious damage under waterlogged conditions.

1220. PARKER, E. R., AND ROUNDS, M. B. 634.653-2.1
Relationship of soil moisture and drainage conditions to tree decline in avocado orchards.
Yearb. Calif. Avocado Soc. 1943, 1944, pp. 34-7, bibl. 11.
Definite correlations were established between the accumulation of free water in the soil and the occurrence of avocado decline. In some cases surface drainage from adjacent land had occurred, in others water had accumulated on the surface near the top of rounded hills, and again in some cases of decline the trees were found to have been planted in holes blasted about 5 feet deep and in these clay had formed an impermeable layer. All measures whereby stagnant water is eliminated help to prevent decline.

1221. HUBERTY, M. R. 634.653-2.1
The drainage and permeability characteristics of the soils on which avocado tree decline and collapse are prevalent.
Yearb. Calif. Avocado Soc. 1943, 1944, pp. 38-9.
Investigations show that decline occurs where the subsoil is impermeable with the result that after rainfall or plentiful irrigation stagnant water collects. In soils of reasonable depth, surface and subsoil drains should alleviate the condition.

1222. DONNELLY, M. 634.653-2.1
Rain and drought in avocado decline.
Yearb. Calif. Avocado Soc. 1944, 1945, pp. 27-31.
FRANCE, J. G.
Avocado tree decline ! So what ?
Yearb. Calif. Avocado Soc. 1944, 1945, pp. 31-5.
POPENOE, W.
Avocado decline in Central Africa.
Yearb. Calif. Avocado Soc. 1944, 1945, p. 35.
The central theme in these three articles is that stagnant water is the primary cause of decline and that drainage and other counter measures are essential.

1223. HODGSON, R. W. 634.653-2.1
Avocado decline investigations. A progress report Oct. 27, 1944.
Yearb. Calif. Avocado Soc. 1944, 1945, pp. 24-7.
The research programme already initiated by the agricultural Experiment Station at Los Angeles is divided into 5 parts:—(1) Drainage and soil moisture trials. (2) Possible relations between soil organisms and tree decline. (3) Field survey, including rootstocks. (4) Possibility of oxygen deficiency in soil and decline. (5) Soil-water relations survey in San Diego County. The beginning of the work on these different projects is noted.

1224. MILLER, J. C. 634.653-1:541.44
Tree replacement and topworking [of avocados].
Yearb. Calif. Avocado Soc. 1944, 1945, pp. 57-9.
The writer recommends rind grafting, by which the scion, cut with a long sloping cut to expose a considerable amount of the cambium, is inserted beneath the rind of the transversely severed limb.

1225. HAAS, A. R. C. 634.653-1.811.9: 546.27
Boron content of avocado trees and soils.
Yearb. Calif. Avocado Soc. 1943, 1944, pp. 41-52.
In avocado seedlings grown in culture solution the following boron deficiency symptoms were shown:—injury to the growing point of the terminal growth, the corking and splitting of veins and trunk, the burning and distorting of the new leaves and the swelling of the young twigs with brown staining of the wood. The young roots disintegrated as the plant died back from the tips. There is as yet no evidence of any boron deficiency in Florida avocado soils.

1226. HAAS, A. R. C. 634.653-2.19: 546.27
Toxicity of boron for avocado seedlings.
Yearb. Calif. Avocado Soc. 1944, 1945, pp. 66-8, bibl. 2.
The tests recorded here show that severe injury may occur if excess boron is brought into contact with avocado roots. This finding may give pause to persons who have on insufficient evidence added boron to the soil of avocado trees showing evidence of decline.

1227. COIT, J. E. 634.653-2.73
Avocado thrips (*Heliothrips haemorrhoidalis*).
Yearb. Calif. Avocado Soc. 1943, 1944, pp. 57-9.
Notes on sprays. Pyrethrum, nicotine and lately D.D.T. have shown promise against avocado thrips. It is essential that the many hosts such as *Statice latifolia*, eugenias, euonymus, and others should also be sprayed.

1228. WEBBER, H. J. 634.421-1.532/535
The guava and its propagation.
Yearb. Calif. Avocado Soc. 1944, 1945, pp. 40-3, bibl. 6.
In California and other countries where frosts may occasionally kill guavas back to the ground, it is desirable to have the roots of the same variety as the top, so that any renewed growth may be of the old variety, hence it is desirable to propagate from cuttings. Stem cuttings root only with difficulty. At the Citrus Experiment Station about 41% success was achieved in 1941 and 22% in 1942 with root cuttings of different varieties taken from lateral roots $\frac{3}{8}$ to $\frac{3}{4}$ inches in diameter cut into lengths of 6 to 10 inches and set directly in the nursery. It is thought that much greater success would have been likely, had the cuttings been handled in greenhouse cutting beds. Lynch, writing from the Subtropical Experiment Station, Homestead, Florida, says that in their experience root cuttings 4 to 6 inches long and $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter do best. These are placed horizontally, about $\frac{1}{2}$ inch below the surface, in flats containing a mixture of about half cutting sand and half shredded peat moss. It is noted that a simple method used in humid countries is to sever roots 2 or 3 feet away from the trunk with a sharp spade, when sprouts will grow from the severed portion, which is later transplanted. The method can also be used in arid countries, provided the soil round the severed roots is kept moist. Notes are also included on budding and grafting methods.

1229. SCHROEDER, C. A., AND COIT, J. E. 634.421
The cattley (*Psidium littorale*).
Yearb. Calif. Avocado Soc. 1944, 1945, pp. 44-7.
A description of a relation of the guava which is grown as a shrub or small tree and as an evergreen hedge but also

bears an excellent fruit for immediate eating. It is more frost-resistant than the guava. It has been propagated almost entirely from seed and shows great variation, but it has not as yet been subjected to selection. It can be propagated by layering, by rooting soft tip cuttings under glass and probably by root cuttings. It is little affected by pests and diseases. Its commercial possibilities are discussed and are worthy of further exploration. So far there have been very few commercial plantings.

1230. KEFFORD, J. F. 635.22: 664.84.22.036.5
Sweet potato varieties for canning.
Food Pres. Quart., 1944, **4**: 9-10.
Of 18 sweet potato varieties tested in Australia Porto Rico ranked first in canning quality. An unnamed Porto Rico cross also gave very satisfactory results.

1231. STARR, D. F., AND SHAW, J. G. 632.77
Pyridine as an attractant for the Mexican fruitfly.
J. econ. Ent., 1944, **37**: 760-3, bibl. 4.
During April and May the attractiveness of yeast-fermented sugar lure for *Anastrepha ludens* was found to be increased 98-143% by the addition of 0·1-0·2% pyridine in 1·0% alcohol solution. In other seasons the increase due to pyridine varied from 10 to 58%.

1232. EGGERS, E. R. 634.653-1.531
(4) **Effect of wet and cold conditions on avocado seedbed stock.**
Yearb. Calif. Avocado Soc. 1944, 1945, pp. 37-9.
They don't like it !

FULTON, R. A., AND MUNGER, F. 634.3-2.944
The effect of the release of liquid HCN on temperature under a fumigation tent.
J. econ. Ent., 1944, **37**: 851-2, bibl. 4.

LEVITT, E. C. 634.3: 636.5
Poultry in the citrus grove. Methods which have proved successful.
Agric. Gaz. N.S.W., 1945, **56**: 123-5.

OSBURN, M. R., AND MATHIS, W. 632.753
Oil sprays with or without derris resins to control Florida red scale.
J. econ. Ent., 1944, **37**: 516-9, bibl. 5.

TROPICAL CROPS.

1233. COLUM, J. L. 551.566.1: 63
The inter-American Institute of Agricultural Sciences.
Agric. Amer., 1945, **5**: 31-3.
A description of the Institute of Agricultural Sciences, newly established at Turrialba, Costa Rica, and a discussion of its aims and its organization on an inter-American basis. The research programme includes the following horticultural and plantation crops: Cinchona, coffee, cacao, fruits and vegetables.

1234. WELLMAN, F. L. 635.1/7(728.4): 551.566.1
Indian gardening in El Salvador.
Agric. Amer., 1945, **5**: 47-9, 57.
An illustrated description of Indian gardening methods in El Salvador under most difficult climate, soil and ground conditions. Seedbeds, planting and cultivation practices and the crops grown are discussed.

1235. INSTITUTE OF TROPICAL AGRICULTURE, VAN OVERBEEK, J., AND OTHERS. 631.535: 551.566.1
Investigations on the fundamentals of plant propagation by means of cuttings.
Second A.R. Dir. Inst. trop. Agric. Mayagüez, Puerto Rico for the fiscal year 1943-44, 1945, pp. 92-9, bibl. 6.
The experiments took place in a brick frame planned by G. S. Garrido of the Mexican Ministry of Agriculture. The frame ensured high atmospheric humidity without excessive humidity of the rooting medium. The temperature of the sand averaged 25·3° C., the lowest recorded being 22·5° C. and the highest 26° C. The average air temperature was 23·2° C. In addition a small wooden propagating frame equipped with thermostatically controlled electric bottom heat was constructed to force the rooting of cuttings. Heating was by electricity. Indolebutyric acid was applied by the talc method (Hormodin) or more often by an effective alcohol dip method. This consisted in briefly dipping the basal end of the cutting in a hormone solution made up in 50% ethyl alcohol. Without treatment, Red Hibiscus roots readily from cuttings, whereas White Hibiscus leafy cuttings fail completely, only the thickest of the hardwood cuttings sporadically producing a few roots. In these trials with White Hibiscus the addition of auxin had no effect. Grafting Red Hibiscus on White cuttings had no effect. But grafting Red on White and treating the base of White with auxin resulted in abundant rooting on the White cutting. This indicates that 2 separate classes of factor are necessary for the rooting of White Hibiscus, (1) auxin and (2) factors present in the shoots of Red Hibiscus. Experiments are now in progress in which Red Hibiscus shoots are grafted on auxin-treated cuttings of avocado, coffee, quinine, mango and other plants. The method of grafting employed as giving the scion a considerable degree of independence is a modification of the whip graft by which a slip of the scion is allowed to extend below the union. This slip is placed in a vial containing water. Experiment showed that the root-inducing influence which comes from the Red Hibiscus travels through the bark of the White cuttings before it reaches the basal part, where roots are induced. Further experiments also showed that ringing Red Hibiscus and applying naphthaleneacetic acid on the ring a week before taking the cutting and following this up by dipping the severed cutting in 50% alcohol solution of 2 mg. of indolebutyric acid very greatly increased rooting. The same principle applied on avocado and cinchona was successful, but it failed on coffee and mango. Trials are also in progress on the respective merits for propagation purposes of coffee material growing at low and high altitudes. Another possibility under investigation is the inducement of root formation in cuttings from old coffee and avocado plants by grafting on to them scions from young plants.

1236. CRANE, J. C. 631.543.83
Living fence posts in Cuba.
Agric. Amer., 1945, **5**: 34-5, 38.
Discussing the selection of trees for living fence posts to which strands of barbed wire are attached, the author reports that progressive people in Cuba consider the use of economic trees for the purpose. *Moringa pterygosperma* and *Anacardium occidentale* are being planted already, though their products (a medicinal oil, tannin and resin) have, so far, not been collected commercially. *Aleurites trisperma*, the soft lumbang oil tree, which produces in its seeds a valuable drying oil, is suggested for trial.

1237. RAHMAN, K. A. 632.6/9(54)
Plant protection service.
Ind. Fmg, 1945, **5**: 161-2.
The need for the development of an All-India Plant Protection Service after the revised Punjab model is emphasized.

1238. PLANK, H. K. 632.951
Insecticidal properties of mamey and other plants in Puerto Rico.
J. econ. Ent., 1944, **37**: 737-9, bibl. 8.
Rapid explanatory tests for insecticidal properties of plants in Puerto Rico revealed outstanding toxicity on four insect

species of parts of *Mammea americana*, the mammea apple or mamey and *Pachyrhizus erosus*, the yam bean. The effective killing dilution was 67% mamey seed dust, which appears to act as a contact insecticide. Yam bean seed dusts were somewhat less effective and were not toxic to *Cerotoma ruficornis*, an insect on which a 90% kill was obtained with mamey dust. Some particulars are given of the mamey in Puerto Rico. The literature on its use as an insecticide is small.

1239. KUMAR, L. S. S. 632.53
Flowering plants which attack economic crops. III. *Loranthus*.
Ind. Frng, 1944, **5**: 460-2.

The list of *Loranthus* hosts in India includes the following fruit trees: Mango, jack fruit, custard apple, lime, orange, *Phyllanthus*, *Eugenia*, guava, pomegranate, tamarind, jujube, fig. An organized, concerted effort to eradicate this plague thoroughly on economic and wild trees in all affected areas is urgently called for. Suggestions are made as to how to remove the parasite with least damage to the host.

1240. AUBRÉVILLE, A. 588.82
Les combretum des savanes boisées de l'Afrique occidentale française. **(The combretums of the wooded savannahs of French West Africa.)**
Travaux Sect. tech. Agric. trop. Minist. Colon. France, Ser. **1**, 1944, pp. 71-110, bibl. 5.

There is considerable confusion concerning the many species of this difficult genus and this is an attempt to clarify the tree and bush species of the open park lands of French West Africa. The forest species are mostly lianes and are not described. There are a number of illustrations.

1241. PROTZMAN, C. M. 633.523
Amazonian jute [*Corchorus* spp.] for coffee bags.
Agric. Amer., 1945, **5**: 23-6.

The recent history is told of the production of Brazilian jute which now occupies an area of about 16,000 acres along the Amazon river and its tributaries. The part played by research in developing this new industry and the still primitive cultivation methods employed are described.

1242. DAS, G. M. 633.523-2.76
Studies on the jute stem-weevil *Apion corchori* Marshall. I. Bionomics and life-history.
Ind. J. agric. Sci., 1944, **14**: 295-303, bibl. 12.

The life history of the jute stem weevil is described, the grub of which is a major, though inconspicuous, pest of jute, causing knot formation in the fibres. Suggestions are made how to assess the damage, the distribution of which over the crop and in individual plants is discussed. Applications of phosphatic and potassic fertilizers were found to increase resistance in the jute plants, while nitrogenous manures increased susceptibility. Two unidentified parasites of the families *Miscogastridae* (*Chalcidoidea*) and *Braconidae* (*Ichneumonidea*) were observed to reduce infestations by 50%. Other control measures recommended consist in destroying the infested material. Of the two cultivated species *Corchorus olitorius* is less susceptible than *C. capsularis*.—Jute Agricultural Research Laboratories, Dacca.

1243. CRANE, J. C., AND ACUNA, J. B. 633.524.3
Effect of planting rate on fiber yield of *Urena lobata* L. as compared with kenaf, *Hibiscus cannabinus* L.
J. Amer. Soc. Agron., 1945, **37**: 245-50.

As a result of an experimental planting the authors come to the conclusion that for specified reasons kenaf is better suited to fibre production under Cuban conditions than *Urena lobata*. The latter should be grown only on fertile soils such as the Matanzas clay. The optimum rate of seeding on such soils appears to be 5-6 lb. per acre or a stand of about 30 plants per square yard.

1244. CRANE, J. C., AND ACUÑA, J. B. 633.522
Varieties of kenaf (*Hibiscus cannabinus*), a bast fiber plant, in Cuba.
Bot. Gaz., 1945, **106**: 349-55, bibl. 10.

Two varieties, *viridis* and *vulgaris* of *Hibiscus cannabinus* are grown in Cuba. How to distinguish these fromh each other and from *H. sabdariffa* is explained in this paper.

1245. CRANE, J. C., AND ACUNA, J. B. 633.524.3
Growth and development of kenaf, *Hibiscus cannabinus* L., with special reference to fiber content of the stems.
J. Amer. Soc. Agron., 1945, **37**: 352-9, bibl. 9.

Kenaf has been recently introduced into Cuba as a source of soft fibre for sugar bags, etc. Trials indicate that for maximum fibre production per unit of land planting should be done at the beginning of the rainy season (April or May), and harvesting should be carried out during the flowering stage (latter part of September), by which time the plants have reached a height of 10-12 feet. The rows should be closer than 20 in., the distance used in the experiment.—Cuban Agricultural Experiment Station.

1246. BOND, T. E. T. 633.72: 581.144
Studies in the vegetative growth and anatomy of the tea plant (*Camellia thea* Link.) with special reference to the phloem. II. Further analysis of flushing behaviour.
Ann. Bot. Lond., 1945, **9**: 183-216, bibl. 20.

For part I of this investigation on the tea plant, carried out under Ceylon up-country conditions, see *ibidem*, 1942, 6: 607-30; *H.A.*, 13: 274. In the second part a consistent theory of the mechanism of flushing behaviour has been built up, on which future anatomical and histological studies are to be based. The results, which were obtained by the extensive use of statistical methods, are presented under the following headings: Apical activity and the flushing cycle (general statement, mutual relationships, the production of scale and flush primordia); growth and " determination " of the primordia (applicability of the logistic curve, appendages and internodes, the growth rates of successive primordia, the early phases of primordial growth, primordial growth-rates and apical activity); vascularization below the apical bud; summary of mutual relationships.

1247. ANON. 633.72-1.543.1
The effect of leguminous shade trees on soil nitrogen.
Plant. Chron., 1945, **40**: 135.

The analysis of 48 soil samples taken at the Tea Research Station, S. India, in the neighbourhood of and at a distance from dadap shade trees indicates that this leguminous tree brings about an increase in soil nitrogen of about 8%.

1248. ANON. 633.73
Annual report and accounts of the [Coffee] Board [of Kenya] for the year ended 31st March, 1945.
Mon. Bull. Coff. Bd Kenya, 1945, **10**: 35-8, 41.

The purchase by the Government of Jacaranda Estate, Ruiru, which is to be developed into a Central Coffee Research Station for Kenya, is described as the most important feature of the year. The poorer coffee areas have been uprooted and are being replanted to Napier grass. The transfer of a nucleus dairy herd for dung production is planned.—The status of coffee thrips, *Antestia* and common coffee mealybug control is briefly discussed by the Entomologist, while the Pathologist-Physiologist reports in a few lines on his studies on flavour development, the effect of shade on the root system and the moisture relations of coffee-bushes. The advantage of mulching during dry years has been demonstrated.

1249. J.H.J. 633.73-1.56
Bénéficio de grano del cafe. —**(Treatment of the coffee crop.)**
Agric. venezolano, 1944, **9**: 101/102: 26-30.
Instructions for the proper methods of harvesting and subsequent treatment (fermenting, washing, drying, etc.) of Venezuelan coffee.

1250. T.V.P. 633.73-1.874
A note on the green manuring of replanted coffee.
Plant. Chron., 1945, **40**: 152.
Observations are being made, on a 2·13-acre site of replanted coffee in South Coorg, of the effect of intercropping with *Crotalaria anagyroides* upon the organic matter content of the soil. About 9 tons of green material per acre were ploughed in during the first year from planting, but so far analyses of treated and untreated soils have not shown any appreciable differences. The investigation is being continued. The impression was gained that the coffee comes better through the dry season in association with *Crotalaria* than without it.

1251. FIGUÈRES, R. 633.73-1.542
Pour comprendre et exécuter la taille du caféier. **(How to prune coffee.)**
Travaux Sect. tech. Agric. trop. Minist. Colon. France, Ser. **1**, 1944, pp. 9-26, bibl. 5.
The general principles of pruning coffee are set out and their application to the different varieties of coffee with modifications suitable to each is described. Many excellent diagrams in colour clarify the instructions to a degree that should render misunderstanding very difficult.

1252. MELLO, P. S. 633.73-1.543.1
A controvérsia sôbre a essência sombreadora. **(The controversy on shade trees for coffee plantations.)**
Rev. Dep. nac. Café (D.N.C.) Rio de J., 1945, **13**: 139: 9-12.
The variety of shade tree of most value for coffee in Brazil is the subject of argument. The author points out that argument is waste of time and that there are many suitable local trees which could be used without depending on the standard foreign importations. Shade trees should have other qualities, if possible, besides that of providing shade. For instance, *Peptadenia colubrina* and *Caesalpinia ferrea* both produce a valuable gum. The former grows fast at the start and slows down later while the *Caesalpinia* makes a slow start and grows faster with age, but both trees at the end of 3 years will be more or less of equal size. No other trees are mentioned by their scientific names.

1253. THOROLD, C. A. 633.73-2.19
Elgon dieback disease of coffee.
E. Afr. agric. J., 1945, **10**: 198-206, bibl. 15.
When investigations on this particular form of dieback of coffee began in 1934, the disease was practically confined to the estates on Mount Elgon in Kenya. Since then incidence of a probably identical malady has been reported from Uganda and India as well as from other places in the Colony. The symptoms of Elgon dieback in its mildest form are reminiscent of the " black tip " appearance associated with " hot and cold ". In its severe form the disease resembles the death of branches resulting from overbearing or loss of leaf, with the difference that usually a few leaves remain at the tip of the branch when the trouble begins to become manifest. The results of the investigation show that Elgon dieback is not caused by pathogens but by too intensive radiation. It develops in stems which shed their leaves prematurely and can be artificially produced by defoliation. The bronze-tip and broad-leaf type of coffee were found to be resistant to the disease but the quality produced may be affected by malformed beans. The author considers that "Elgon dieback and ' hot and cold ' are probably due to carbohydrate deficiencies which commonly occur in coffee grown without shade, under the soil conditions prevailing where these diseases occur. Practical control and the respective merits of shade or the resistant type without shade are considered. The susceptible-type trees in a plantation can be converted to resistant ones, by grafting onto them, either the stems from bronze-tip and broad-leaf trees, or the seedling progenies derived from them. Grafting avoids certain disadvantages inherent in replanting or in interplanting. The establishment of shade trees is the best method for controlling Elgon dieback and ' hot and cold ' diseases. The most desirable course in the prevention of these diseases would be to plant *Entada abyssinica* to provide shade and then to establish a uniform type of coffee known to produce ' beans ' of good quality. The Blue Mountain variety is proposed for this purpose because of its additional merit of resistance to Coffee Berry disease "—Kapretwa Estate, near Kitale, Kenya Colony.
In a postscript by S.G.[illet] two observations are recorded which were made after the completion of the author's study: (*a*) Whilst the bronze-tipped, broad-leaved type of coffee " is highly resistant to Elgon dieback, areas of this type on exposed sites have succumbed to this form of dieback during the past two years. It is recommended that efficient windbreaks be planted outside the coffee on all such exposed areas; (*b*) the variety known as Blue Mountain will not produce economic crops when cultivated under heavy shade. In areas where both coffee berry disease (*Colletotrichum coffeanum*) and Elgon dieback are liable to occur, it is recommended that this variety be planted but that it be subjected to a very light canopy of shade ".

1254. MELVILLE, A. R. 633.73-2.73
A further note on spraying for thrips.
Mon. Bull. Coff. Bd, Kenya, 1945, **10**: 20.
For the previous article see *ibidem*, 1944, 9: 123-5; *H.A.*, 15: 838. The present progress report is based chiefly on trials conducted on a field scale on a farm at Ruiru. Additional instructions given refer to the mixing of the paris green spray (formula, see *H.A.*, 15: 838) and to the rate of its application. Recent experience has shown that one pint of spray may be required for a large leafy single tree, but that generally this quantity must be regarded as an overdose, some trees wanting as little as ½ pint. In order to reduce the risk of an overdose causing leaf scorch the spray should be applied in fine droplets which do not thoroughly wet any of the foliage. The use of a good quality hydrated lime will further help to minimize the danger of the mixture with which excellent kills were obtained at the low dosages recommended. So far, the Eclipse No. 1 has been the most satisfactory sprayer for the purpose, large sprayers should be used only if they are capable of producing a fine mist spray and are not liable to exceed the low rate of application.

1255. HUMPHRIES, E. C. 633.74: 581.1
Physiological and biochemical researches in cacao 1943-44.
Trop. Agriculture, Trin., 1945, **22**: 66-8, bibl. 6.
A report of work carried out at the Imperial College of Tropical Agriculture, Trinidad, since the publication of the 1941-3 annual report. In physiology the studies on the problem of the causes of cherelle wilt have been concerned with the changes in the mineral content of the fruit during development and with the seasonal fluctuations in the carbohydrates and mineral reserve of cacao trees throughout a complete season. The observations made are summarized at some length. In biochemistry the tannins of the cacao bean and their behaviour during autolysis and certain other problems of fermentation formed the main study.

1256. CHEESMAN, E. E. 633.74
Field experiments in cacao research.
Trop. Agriculture, Trin., 1945, **22**: 64-6.
The performance in yield of various cacao clones at the Imperial College of Tropical Agriculture during the past year are noted. Results of comparisons in yield between budded

trees and trees from cuttings show in experiment a high degree of statistical significance in favour of cuttings in most cases, but there is a tendency for the superiority to diminish with age. There is some probability that the superiority of cuttings over buddings is a clonal character, since in at least one clone, ICS_2, buddings are superior. In a case where the buddings were planted before the cuttings, reversing the bias of age, buddings gave the higher yield. The comparison of mixed buddings with mixed cuttings may therefore be misleading, and the two methods are to be compared clone by clone, using trees not less than 5 years old. Knowledge of the effect of the root system on yield may be acquired in this investigation. The variation in yield between yields from trees raised from fan or chupon is, so far, inconsiderable.

1257. ANON. 633.74-1.543.1
New tree for shade of cacao.
Agric. Amer., 1945, **5**: 117.

It has been suggested by the Rio de Janeiro Botanical Garden that the tree *Erythrina velutina* should be replaced by *Clitoria racemosa* for shading cacao. The latter, an ornamental leguminous tree, unites the advantage of an unusually quick growth and a wide-spreading crown with potential value as a source of edible oil. *Clitoria* comes into bearing after 5-6 years, yielding about 22 lb. of seed with an oil content of 22% and 8% protein.

1258. BOX, H. E. 633.74-2.8
Insect transmission of the "swollen shoot" virus in West African cacao.
Nature, 1945, **155**: 608-9.

Exploratory experiments carried out at the West African Cacao Research Institute, Tafo, in 1943-4, tested 4 virus strains of which one was virulent. Successful transmissions were obtained through various mealybugs of all four. The virulent strain was transmitted by *Ferrisiana virgata* and *Pseudococcus exitiabilis*, the latter being new to science. Two of the milder strains producing leaf mosaic only, though of differing patterns, were transmitted by *P. citri*, and a mild strain resulting in some shoot swelling and occasional chlorosis was attributed to *P. exitiabilis* alone. An aphid and a psyllid were ineffective. The virulent strain could be transmitted by a single female of *P. exitiabilis* and by its larval stages. The earliest recognizable symptoms occurred 5 weeks after transfer of mealybugs from infected plants; in one case the insects had fed on the infected source plant not longer than 48 hours.

The following summaries of conference papers were kindly placed at the disposal of the Bureau prior to publication of report: abstracts 1259-1285.

1259. COLONIAL OFFICE, LONDON. 633.74
The long term objectives of cocoa research.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.

Broadly, the long-term objective of cocoa research is to ensure the maintenance of a profitable cocoa growing industry in the Empire. Cocoa is an Empire export and therefore its prosperity depends on the prosperity of international trade. The normal task of agricultural research with any crop is to promote maximum efficiency in the production and utilization of the crop. The main objectives of production research and utilization research are briefly mentioned.

1260. COLONIAL OFFICE, LONDON. 633.74
The history of cocoa research in the Colonial Empire.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.

The history of cocoa research in West Africa and the West Indies is briefly outlined. This provides a background for the present conference and indicates that much consideration has already been given to the many problems of cocoa production and much preliminary work has been accomplished.

1261. COLONIAL OFFICE, LONDON. 633-74(729.8)
The organisation of cocoa research in the British West Indies.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.

The research conducted by the Imperial College, Trinidad, covering work on cacao soils and cacao types, is well known. It is financed by contributions from the principal cocoa manufacturers and from the Government of cocoa producing colonies. It is understood that the work will be continued.

The cocoa research proposals of the Agricultural Policy Committee of Trinidad and Tobago fall under three heads which are described.

The Committee considered that short-term research should be applied to the interactions between soil, shelter, shade and spacing and to the investigation of the suitability of available varieties to ecological conditions, to pest and disease resistance and in respect of quality.

Under long-term fundamental research the Committee included the application of physical, chemical, biochemical and biological methods to the study of soils in cocoa and adjacent forest areas, also the physiological study of the plant and its nutritional status and the selection, primarily, for disease-resistant types and secondly for yield and quality.

The Committee stressed the need for the establishment and maintenance of a collection of all available types of cacao and for genetical research in connexion with disease resistance, quality, partial sterility, pollination, etc.

The Committee recommended a Central Research Station of some 750 acres, fully staffed with technical officers and financed by Parliament, together with 6 small sub-stations financed by the Trinidad Government for testing selected strains, propagation work, etc.

A joint memorandum by the Director of the Imperial College and the Inspector-General of Agriculture British West Indies stated that fundamental work was required to cover every phase of land use under high rainfall conditions, if the problems associated with the satisfactory utilization of lands are to be thoroughly understood. It also advised that the study of alternative cropping of high rainfall areas now incapable of cacao production, was a problem for the local Department of Agriculture.

It is for the Conference to make full recommendations.

1262. VOELCKER, O. J. 633.74(669)
Aims and objects of the West African Cocoa Research Institute.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.

The W.A.C.R. Institute was established primarily to meet the immediate need for research aiming at the control of the "swollen shoot" disease and the *Sahlbergella* pest. The general research programme was laid down by the Agricultural Adviser in 1943.

Entomological research aimed at covering the life histories and seasonal fluctuations of the main pests, breeding and control technique, etc.

Botanical work was designed to discover and multiply disease-resistant strains, differentiation and incidence of viruses, alternative hosts, rate of spread and methods of immunization, etc. Chemical studies embraced soil factors influencing growth, yield, longevity and the incidence of disease, etc., and methods of cultivation were also included as well as the adaptation of research results to native practice.

As the problems of disease and pest control are solved, new research vistas are bound to evolve including cytological work and the better preparation of the beans for market.

A warning is given that the economics of production must be closely watched.

1263. NICOL, J. 633.74-2.754
The present position of research on capsid pests in West Africa.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.

This paper is a survey of the work done on "capsid" problems rather than a record of accomplishment.
Records of all phases of the life histories (under field conditions) of the various "capsids" detrimental to cacao are being compiled; these already show seasonal variations in the life cycles of the insects.
It is stated that, to date, the numbers of the chief "capsids" continue to increase well into the dry season even when pod numbers are much reduced.
Flight ranges indicate that *Sahlbergella singularis* can travel at least 185 yards and *Distantiella theobroma* some 320 yards from source of release. The parasitism of *Euphorus sahlbergellae* averages 1% with *S. singularis* and 8% with *Bryocoropsis laticollis*, while *Euphorus* is lightly superparasitized by *Mesochorus melanothorax*.
While preliminary work showed little resistance by individual cacao plants to capsid attack, more recent work portrayed one tree with trinitario characters which appeared to offer high resistance to attack. A clone grown from this tree has not yet given decisive results but shows less attraction to *D. theobroma* than to *S. singularis*.
A progeny trial at Tafo in which certain selections seem to have escaped damage by capsid, indicates that capsid resistance may be connected with genetical factors.
Chemical control tests show that no practical difficulties confront the control of "capsids" as nymphs or adults, though the eggs, laid in plant tissues, are difficult to destroy. There is need, however, for more experimentation and costing on a field scale before spraying can be recommended to farmers.

1264. POSNETTE, A. F. 633.74-2.8
Cacao virus research in West Africa.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.

The havoc wrought by swollen shoot disease is portrayed by the very heavy loss *in crop from one typical farm in a decade*. In Nigeria, too, rapid spread of virus disease is reported.
Isolated outbreaks are mostly found in cacao of more than 20 years old. Roguing accompanied by the destruction of affected trees has been found to check the spread of the disease, even on native farms. Replanting meets with temporary success which would be more permanent if infected trees could be eliminated beforehand.
Swollen-shoot disease can be caused by a complex of viruses, which may fall into two groups distinguished by symptoms and probably vectors.
There is no evidence of seed transmission of the strains A, B and C or of transmission through pollination. Immunization tests are inconclusive and there is no definite knowledge regarding alternative host plants. Selection for resistance and tolerance on graft infected plants shows much variation but clones with promising toleration are established. Given adequate facilities, there are no fundamental obstacles to progress.

1265. SQUIRE, F. A. 633.74-2.754-2.96
Notes on biological control [of *Sahlbergella*].
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.

Biological control of *Sahlbergella* etc. has possibilities. Only one parasite—the wasp *Euphorus*—is yet known. This parasite is itself slightly hyperparasitized by *Mesochorus*. Systematic search is needed in all cocoa producing countries to find other parasites alternative hosts, hyperparasites. Research into breeding technique, etc., is also needed.

1266. YOUNG, A. H. 633.74(669)-1.563
Cocoa storage in Nigeria.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.

Good cocoa storage conditions are described. An easy method of control of the cocoa moth, *Ephestia*, is mentioned, namely weak carbolic soap solution, and fly papers are also successful.

1267. YOUNG, A. H. 633.74(669)
Grading and classification of cocoa in Nigeria.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.

Grading of cocoa devised in conjunction with the merchants, and depending on the dryness, freedom from mouldy, weevily decayed, smoky and unfermented beans is described. An index for cocoa, proposed by the Office International du Cocoa in 1938, is outlined.

1268. BECKETT, W. H. 633.74(667)
Research and the peasant producer.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.

The peasant farmers produce a large percentage of total production and therefore the economic and sociological implications must be studied before the results of research can be applied satisfactorily.
Some idea of the social system to be aimed at is necessary in applying research and the author sees no alternative to communal farming.
He contends that the best natural cocoa lands should be reserved for cocoa, using the less fertile areas for food production.

1269. WEST, J. 633.74(669)-1.521
Development of cacao selection in Nigeria.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.

The objective of selection is the maintenance or renewal of existing areas.
Over 18,000 self- and cross-fertilized progenies of disease-resistant selection have been planted in Nigeria in 5 experimental farms. These include local as well as introduced selections.
Selections are based on number of pods per tree (minimum 90), bean size, colour and self-compatibility. Some heavy yielding progenies have proved self-incompatible. Little variation was found in butter-fat content where the crops were harvested under similar conditions, but a light crop gave a lower content than a main crop and fermented beans a higher fat content than unfermented beans.
Cross-fertilization did not result in increased vegetative vigour. Black pod disease was found to be controllable by the removal of infected pods and by regular harvesting. Hand-picking did not prove beneficial in the control of *Sahlbergella*.
Cacao cultivation in Nigeria depends on the length of the dry season, soil types and the incidence of *Sahlbergella*. The use of basket plants gave much the best results in the field and shade proved necessary for young plants. Trials of various shade plants and trees are in progress. Spacing distance and fertility of soil effect yields materially as shown by figures.

1270. HARDY, F. 633.74-1.4
Soils and soil types suitable for hybridisation of cacao and the improvement of cacao soils by manuring.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.

For selection experiments, the author stresses the need to use good average cacao soils and indicates the characteristics of such soils—deep permeable, moisture-retentive and

fertile with a relatively high C/N ratio and adequate available potash. He points out the value of shade and well developed root systems and the dangers of lime and magnesium.
Soil types suitable for cocoa are discussed including alluvial, volcanic ash or conglomerate, "greensands" Rendzinas (marly) and fine-grained schists.

1271. POUND, F. J. 633.74(8)
A note on the cocoa population of S. America.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.
Following the Amazon river from east to west surprisingly different types of cocoa have been found, the larger finer flavoured types being towards the western extremity.
At various points in this 3,000 mile route, local dominant types occur but the chain of evolution between the Brazilian and the Equadorian types is unbroken. A white-shelled pod as opposed to the green pod occurs, and this type is regarded as the most primitive cocoa type yet found. Numerous types are described.
Similarly, the Colombian-Andean cocoa population contains many different types which are briefly described. Area dominance is apparent but the evolution is traceable.
The author stresses the value of a complete survey of types before initiating selection experiments so that they may embrace all potential material, whether the search is for yield or disease-resistance or any other character.

1272. POUND, F. J. 633.74-1.521
The selection of cocoa trees on the basis of productive efficiency and the requirements of the manufacturers of chocolate.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.
The discovery from River Estate data that 48% of the trees only gave 4% of the crop showed what a wide scope existed for selection work with the cacao crop.
Replacement of poor bearers using the progeny of high bearing trees, have materially increased the yields on that estate.
Net returns depend on various factors which need investigation separately.
In selecting for yield in Trinidad the minimum standards were 60 pods per 144 square feet of ground occupied by the plant and not less than 160 grammes of wet bean per pod. Most trees with individual beans weighing less than 4 grammes were also eliminated because large beans are preferable to small ones. Also self-incompatible trees were eliminated.
Clonal, agronomic and manufacturers' tests have finally to be applied to selected tree types.

1273. POUND, F. J. 633.74(86)
The plans for cacao research in Colombia.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.
Cocoa has been grown in Colombia for centuries and cultivations are now found in many varying conditions from sea level to 3,000 feet altitudes. Many different types of cacao are also found. An outline is given of the programme of research work recommended to the Republic, which has already been started.
Two stations for research work have been selected and a team of agricultural officers has been given the task of searching for the most desirable trees, for which minimum standards have been set.
Whilst awaiting fully selected material—many years—Colombian farmers have been advised to plant seeds of selected near criollo plants, 5 seeds per hole, roguing later to one plant per hole.

1274. THOROLD, C. A. 633.74-2.4(729.87)
Cacao diseases in Trinidad.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.
It has been found impracticable to control witches broom disease by spraying or removal of brooms, therefore the search for disease-resistant plants was instituted. This search should be helped materially by the collection of seed and clones imported into Trinidad from South America.
While vegetative resistance to "broom" is apparent between clones, resistance to pod infection has not yet been established.
Symptoms of virus disease, embracing two strains have been found in limited areas in Trinidad but, so far, the disease appears to be of little economic importance. Black pod disease occurs generally, especially in wet areas, but is not regarded as important since the beans appear to be little affected. In pods affected with witches broom, the beans are partially or entirely destroyed.
Fungus diseases of the root, stem, branch and leaves are mentioned but they rarely prove severe.

1275. PICKLES, A. 633.74-2.6/7
Pest problems of cacao cultivation in Trinidad and Tobago.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.
In using selected and valuable plant material there is need for the adoption of some simple routine treatment to protect young plants from pests, which are often not easily evident until they are well established.
Various insect pests, the factors affecting their incidence, their effects on the plants and means of control are discussed, including thrips, cacao beetle, scale insects, leaf eating beetles. Damage by squirrels, rats, birds (parrots) and the manicou (*Philander trinitatis*) is recorded and is controllable on well-maintained estates but in neglected areas control is difficult, especially in wartime.

1276. CHENERY, E. M. 633.74-1.4(729.87)
A digest of the cacao soils in Trinidad and Tobago.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.
Trinidad cacao soils are graded into 5 grades according to productivity. The origins of these 5 soil types and the salient features of each are described. The areas of each are given.
Grade I. 500 lb. dry beans per acre, 5,000 acres approx.
Grade II. 330-500 lb. dry beans per acre, 50,000 acres „
Grade III. 165-330 lb. dry beans per acre, 100,000 acres „
On Grades IV and V production is uneconomic and their cultivation for cacao will be discouraged.

1277. CHEESMAN, E. E. 633.74(729.8)
The organization of cocoa research in the British West Indies.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.
The principle that the Imperial College should tackle long-term research problems in cocoa while the Department of Agriculture should handle short-term problems has worked satisfactorily for 15 years and should continue to do so.
The author outlines short-term and long-term problems and indicates the future requirements of the College as to land, staff, funds, etc., and maintains that even if some overlap with the work in West Africa occurs it would be complementary rather than competitive.

1278. CHEESMAN, E. E. 633.74
Research aspects of quality in cocoa.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.
Uncertainty regarding the future of the quality market has led to concentration on yield problems rather than quality. The importance of genetical constitution of the trees and the processing of the beans is fully realized, while more evidence as to the importance of environment is desirable.
Plans are being formulated for studies of variation in quality between clones to proceed, in co-operation with manufacturers.

1279. CHEESMAN, E. E. 633.74: 575.1
Genetical researches on *Theobroma*.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.
Genetical investigations cover a wide field of long-range research. The prime requirements embrace the establishment and maintenance of a duplicated type collection on a generous scale and the study of factors contributing to yield, disease resistance, quality, self-incompatibility, etc., in the search for selected types more profitable than those now in cultivation.
Future improvement will take place by an alternation of hybridization and selection and the steps in this work are outlined. It is suggested that the Imperial College should concentrate on breeding and genetical work with Criollo and Trinitario groups of cocoa, while West Africa concentrates more on Amazonian types.

1280. CHEESMAN, E. E. 633.74: 581.1
Physiological researches on *Theobroma*.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.
Physiological research, covering both the plant and its environment, is the ultimate basis for the improvement of cultural methods.
The functions of shade in cocoa are especially important from many aspects and, in general, physiological investigations are a necessary part of any balanced long-range programme of cocoa research.

1281. MONTSERIN, B. G. 633.74-1.535
Vegetative propagation of cocoa by cuttings.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.
Propagation by vegetative methods has become necessary to preserve the genetic uniformity of desirable characteristics, but interaction between stock and scion influence uniformity so much that attention has been diverted since 1930 from budding to propagation by cuttings.
The technique employed is based on the striking of semi-hard wood cuttings in a medium of coarse sand contained in bins designed to control humidity, light and wide fluctuations of temperature. When roots have developed the cuttings are transplanted into potting soil and subjected to a gradual hardening process covering at least 5 weeks. Young vigorous nursery-grown trees provide the best material for cuttings which must be taken at the correct stage of maturity. This occurs immediately after the leaves produced by a vigorous flush have hardened.
Details are given of the hardening process and of the layout and construction of propagators, while mention is made of many useful hints including the use of hormones for stimulating early and regular rooting, etc.

1282. THE COCOA AND CHOCOLATE (WARTIME) ASSOCIATION. 633.74
General world situation.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.
The serious world position of cocoa production and the probable greater post-war demand are stressed as well as the need for the rehabilitation of old areas and the location of new areas suitable for planting cocoa.
A map portraying the alarming spread of disease in West African cocoa areas is given and concern as to the spread of virus diseases in Nigeria and Trinidad is recorded.
A co-ordinated plan dealing with all cocoa research is required and will doubtless be supported by commercial cocoa interests.

1283. POUND, F. J. 633.74
The plan of subsidised cacao rehabilitation in Trinidad and Tobago.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.
Considerable areas of existing cacao are planted on unsuitable soils where production is uneconomic. Surveys reveal that approximately 120,000 acres of land suitable for cacao are available and the Rehabilitation Scheme is briefly outlined.
The financial provision for the Scheme allows for the replanting of 10% of the suitable areas subject to a maximum of $333 per acre. The necessity for heavy manuring to get good crops is stressed and a method for replanting by small proprietors is described which should prove highly beneficial to the industrious small farmer.

1284. BUXTON, D. A. J. 633.74-2.8
Cocoa moth *(Ephestia clutella).*
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.
The life history of this serious pest of warehouses is described. The number of sources from which cocoa comes makes control more difficult. A quick optical determination of presence or absence of the pest in cocoa bags is not possible. Three remedies suggested, namely cyanide fumigation, the use of sticky bands, and pyrethrum spraying, have not proved satisfactory.
The suggestion is made that the results of impregnating cocoa bags with D.D.T. might be successful and should be investigated.

1285. BARTLETT, S. 633.74-1.57
A note on cacao bye-products.
Rep. Cocoa Conference, London, May 28-June 1, 1945, pp. —.
1. The data presented suggest that when cacao products are fed to animals they produce adverse symptoms when the daily dose of theobromine exceeds 0·025 gm. per kg. body weight. It is not known whether, when the daily intake is below this level the cacao products are of any nutritive value to animals or poultry, and very sensitive or critical experiments are needed to demonstrate this point.
2. Assuming that cacao products are of nutritive value when the theobromine intake is below 0·025 g. per kg. body weight, then the maximum proportion of cacao products (2% theobromine) which could be included in poultry or pig food is 2½%.
3. If cacao products prove useless as animal foods the two alternate methods of disposal of the bye-products is (*a*) as fuel and (*b*) as fertilizers. The value of cocoa bye-products for these purposes is dealt with in *U.S.D.A. Dep. Bull.* 1413.

1286. CORRELL, D. S. 633.821
Vanilla: its history, cultivation and importance.
Lloydia, 1944, 7: 236-64, bibl. 16.
Vanilla is fully treated under the following heads: The product and its source, history and distribution, use and economic importance; horticulture; harvesting, curing and processing the beans; substitutes and miscellaneous information. In spite of some difficulties it is believed that the island of Puerto Rico is capable of supplying most, if not all, the vanilla beans needed in the United States, where the flavouring substance is used in large quantities. Suitable land is available, especially in the coffee area.

1287. CHOWDHURY, S. 633.833
Tejpat [*Cinnamomum Tamala* and *C. obtusifolium*] cultivation in Sylhet.
Ind. Frng, 1944, 5: 568.
Extensive plantations of tejpat exist in the Jaintia parganas, Sylhat, Assam, where wild plants provide the seeds and seedlings. The annual yields average 15 seers (about 30 lb.) of dry leaves per tree. The trees come into bearing at the age of 10 years and may continue to give annual crops for 50-100 years. In view of the low cultivation cost from about the ninth year onward tejpat is a profitable crop. The leaves are used as spices but can be employed also with myrobalans in dyeing and in the manufacture of vinegar.—Plant Pathological Laboratory, Sylhet, Assam.

1288. ASTHANA, R. P., AND MAHMUD, K. A. 633.841-2.3
Bacterial leaf-spot of *Piper betle*.
Ind. J. agric. Sci., 1944, **14**: 283-8, bibl. 6.
The annual loss to pan growers due to bacterial leaf-spot disease in the Central Provinces and Berar is considerable. Symptoms of the disease are described. The disease is more prevalent during wet weather, in heavy soils and in low-lying waterlogged gardens. The bacterium enters the leaves either through stomata or injured surface. Irrigating the gardens with 4: 4: 50 bordeaux mixture one week prior to planting and spraying the vines with 2: 2: 50 strength bordeaux mixture every two months successfully controlled the disease and the cost of treatment will amply reward the growers financially. [From authors' summary.]

1289. ASTHANA, R. P., AND MAHMUD, K. A. 633.841-2.3
A new bacterial leaf-spot on *Piper betle*.
Curr. Sci., 1945, **14**: 72, bibl. 5.
The technical description of the disease is followed by the suggestion that the causal organism is a new species which is provisionally named *Bacillus betle*.

1290. STEERE, W. C. 633.88.51
The botanical work of the *Cinchona* missions in South America.
Science, 1945, **101**: 177-8.
The cutting off of supplies of quinine when the Japanese invaded the Dutch East Indies made it necessary to seek other sources. By agreement with the South American republics concerned botanical missions were sent to investigate the natural resources of Colombia, Ecuador and Guatemala and made valuable discoveries including an unsuspected source of quinine in *Remijia pedunculata* on the west slopes of the Eastern Andes. The bark of this tree gave up to 3% of quinine sulphate almost free from other alkaloids. *Cinchona pitayensis* was rediscovered in the Central Andes and found not only to be relatively abundant in southern Colombia and Ecuador but also to be the species richest in alkaloids, with an average of 3% quinine sulphate and 5% to 6% of total crystallizable alkaloids. *Cinchona pubescens* from the Ecuadorian Andes has occasional races surprisingly rich in alkaloids. The forests of Bolivia and Peru have been so thoroughly and destructively exploited in the past that the Cinchona is only left in inaccessible parts of the countries. The availability of chemical analysis on the spot has brought to light physiological distinctions between the species, varieties and forms not hitherto suspected and has provided an important approach to the interpretation of a complex and misunderstood genus.

1291. SORENSEN, H. G. 633.912
Colombia's plantation rubber program.
Agric. Amer., 1945, **5**: 106-8, 114-5.
An outline of the development of the *Hevea* rubber programme carried out as a co-operative project by the Ministry of National Economy of Colombia and the Bureau of Plant Industry of the U.S. Department of Agriculture. The establishment of nurseries and plantings in the Urabá region in Western Colombia was begun in 1941 after the completion of the survey and was followed by preparatory work for the establishment of 3 demonstration plantations with a total area of 3,000-3,750 acres in 1942. A setback was experienced in 1944, 78% of the planting material having succumbed to leaf blight. Unusual resistance to the disease, however, was shown by seedlings raised from seed obtained in the Leticia region. It is expected that 20,000 sticks of budwood will be available in 1945. Budding on *Hevea spruceana*, which does not make a good rootstock, had to be discontinued, but a 10-acre block will be planted with 50% *H. spruceana* and 50% resistant Ford selections in order to obtain a supply of high-yielding hybrid seed for the future extension of the rubber programme in Colombia, the first phase of which will be concluded in 1946. The work will be further assisted by the completion of the Inter-American Highway in 1947.

1292. CORRELL, D. S. 634.6
The African oil palm: its history, cultivation and importance.
Lloydia, 1944, **7**: 101-20, bibl. 30.
The detailed information on the African oil palm, *Elaeis guineensis*, compiled by the author, is presented under the following heads: Product and its source; use and importance; history and distribution of plant, wild and cultivated; horticulture [as practised in different parts of the world]; harvesting and processing; the oil palm in America. The last chapter makes it clear that the industry has great possibilities in Brazil, particularly in Bahia and other coastal States and in certain fertile regions of the interior, once the problems of transport, modern machinery and labour have been solved. Two types are grown in Brazilian plantations: the "sombra" variety, producing a medium-sized fruit, and the "caboclo" variety, which produces an enormous fruit cluster with individual fruits as large as a small apple. Under conditions of shade, in marshy places, swamps and wet clay soils the African oil palm should be supplemented by the corozo palm (*Alfonsia oleifera* or *Corozo oleifera*), which is grown in Central America, Colombia and the Amazon region. The significance of additional oil-producing palms occurring in the wild form from Mexico to southern Brazil has not been fully realized yet. In Brazil, the potential value of the wild babassu palm nut (*Orbignya barbosiana*) crop alone is estimated to be 5 times that of the coffee crop.

1293. MURRAY, D. B. 634.6
The oil palm research station of Nigeria.
Trop. Agriculture, Trin., 1945, **22**: 93-6.
An account of the origins and work of the Oil Palm Research Station in Nigeria. The site of 4,000 acres of secondary forest, at least 50 years old, was surveyed and laid out in 100 acre blocks in 1938, of which one block is for permanent European houses and 3 blocks for a model African village. A mill will later be erected. The full details of the work of this Station are omitted for lack of space. They are, however, well covered in the abstracts of the Annual Reports, *H.A.*, 13: 666 and 14: 421 dealing with the first four reports of the station from 1939/40 to 1942/3.

1294. MARTYN, E. B. 634.61-2.4
Coconut diseases in Jamaica. I and II.
Trop. Agriculture, Trin., 1945, **22**: 51-9, 69-76, bibl. 25.
A review of the coconut diseases of Jamaica shows that bronze leaf wilt is potentially the most serious, though fortunately it is not widespread. Bronze leaf, for which no cause has yet been traced although investigations here and in Trinidad have been going on at intervals for years, is dealt with in detail and reasons are given for showing that the present theory as to cause (unsuitable soils) does not explain the recorded and observed facts. The author considers the disease to be infectious and advocates the cutting down and burning of the crown of the diseased palms, and legislation now enforces this. Another disease which rapidly destroys the bud and so kills the palm is bud rot (*Phytophthora palmivora*); trees also are often killed through bud damage caused by lightning. Bitten leaf and St. Mary disease affect the emerging leaf without killing the bud and are therefore usually non-fatal. Both are attributed to unsuitable environment. Leaf spots, die back, drought wilt, leaf break, yellowing, pencil point and false wilt may affect the appearance of the whole crown but are not immediately fatal. The stem is affected by stem bleeding and infected leaf scars. A key is given by which each of these diseases can be easily recognized. Most of them can be attributed to unsuitable environment in one form or another. Most of the fungi associated with them are of secondary importance. The necessity for some research on the nutritional problems of coconuts in Jamaica is recognized.

1295. HANCOCK, W. G. 634.774(943)
Pineapples in North Queensland.
Qd agric. J., 1944, **59**: 332-40.

In recent years, the art of growing pineapples has made great progress. Although the experimental work, from which the industry has benefited so much, was carried out in the south, its results are applicable, with certain modifications, also to North Queensland. It is the object of this article to adapt our latest knowledge on the subject, obtained under more moderate conditions, to the climatic extremes prevailing in North Queensland. This is done by giving a full description of pineapple culture in the north, where the crop is grown for market rather than for the canner, under the following headings: Soil and site, preparation, planting, planting material, sucker selection, time of planting, cultivation, fertilizing—special treatments, picking and marketing and diseases, of which there are hardly any.

1296. TAM, R. K. 634.774-2.951
The comparative effects of a 50-50 mixture of 1: 3 dichloropropene and 1: 2 dichloropropane (D-D mixture) and of chloropicrin on nitrification in soil and on the growth of the pineapple plant.
Soil Sci., 1945, **59**: 191-205, bibl. 14, being *tech. Pap. Pineapple Res. Inst. Univ. Hawaii* **157**.

One hundred pineapple plants grown in large enamelware pots of 0·8 cubic foot capacity were used in this study of nitrogen nutrition as influenced by soil disinfection with D-D and chloropicrin. As a result of the suppression of nitrification for at least 24 weeks following soil treatment with chloropicrin at the rate of 200 lb. per acre the plants did well on a nearly completely ammonium diet, which was associated with the highest rate of N absorption. The application of 200 lb. D-D was found to prevent nitrification for 8 weeks, while 400 lb. D-D proved more effective than half the dosage but less beneficial than 200 lb. chloropicrin. Plant growth following all three treatments was superior to that of the controls. In some cases the stimulating effect of D-D became manifest only a year after treatment, the delayed response being related to the destruction of pathogenic soil organisms accompanied by the development of a healthier root system at maturity. It is suggested that D-D may be particularly suitable for crops which thrive better on nitrate nutrition. Full data on the distribution of nitrogen in the different tissues of treated and untreated plants are presented.—Pineapple Research Institute of Hawaii.

1297. SETH, L. N. 635.8
Cultivation of mushrooms in Burma.
Ind. Fmg, 1944, **5**: 520-2, bibl. 3.

Cultivation trials at Maymyo showed that the common mushroom can be successfully and profitably grown under Burma conditions. The cultivation method is described. Since the mushrooms would stand transport to Rangoon, it is believed that such a subsidiary industry would have good prospects in Burma.

1298. BARÇANTE, I. 635.1/7(81)(8)
Espécies hortícolas. (**The cultivation of some common vegetables in Brazil.**)
Publ. Serv. Inform. agric. Rio de J. (*S.I.A.*) **413**, 1944.

CARTER, W. 634.774-2.752
A striping of pineapple leaves caused by *Pseudococcus brevipes*.
J. econ. Ent., 1944, **37**: 846-7.

DODDS, K. S. 634.771: 576.3
Genetical and cytological studies of *Musa*. VI. The development of female cells of certain edible diploids.
J. Genet., 1945, **46**: 161-79, bibl. 24.

LASSER, T. 586.781(81)
Laureáceas nuevas de Venezuela. (**New *Lauraceae* of Venezuela.**)
Bol. técn. Minist. agric. Venezuela **3**, 1942, pp. 19.
Illustrated descriptions of 15 specimens.

LEPESME, P., AND VILLIERS, A. 633.73-2.76
Les longicornes du caféier en Afrique intertropicale. (**The longicorn beetles attacking coffee in equatorial Africa.**)
Travaux Sect. tech. Agric. trop. Minist. colon. France, Ser. **1**, 1944, 27-70, bibl. 30.
Description and habits illustrated.

SENARATNA, J. E. 633.682: 581.466
Bisexual flowers in the manioc, *Manihot esculenta* Crantz (*M. utilissima* Pohl.).
Ceylon J. Sci., 1945, **12** (Sec. A), pp. 169.

STEVENSON, E. C. 633.85-2.4
***Alternaria ricini* (Yoshii) Hansford, the cause of a serious disease of the castor-bean plant (*Ricinus communis* L.) in the United States.**
Phytopathology, 1945, **35**: 249-56, bibl. 16.

STEWART, W. S., AND HUMMER, R. W. 633.913
Inverse correlation between rubber hydrocarbon and a crystalline fraction isolated from latex of *Cryptostegia grandiflora*.
Bot. Gaz., 1945, **106**: 333-40, bibl. 10.

STORAGE.

1299. SMOCK, R. M. 664.85
The physiology of deciduous fruits in storage.
Bot. Rev., 1944, **10**: 560-98, bibl. 198.

This review of the available information on the physiology of deciduous fruits and how it may be controlled in storage deals with transpiration, respiration, production of organic volatile materials and chemical changes during storage, raising among many others the following points: Work is needed on the control of surface moulds, which constitute a grave danger when the relative humidity is kept at a high level so as to reduce transpiration. Respiration is considered the best single index of metabolic activity, though it is not the sole factor determining the potential storage life. It is believed that a fuller understanding of fruit respiration is necessary for the provision of better storage conditions. This applies especially to stone fruit, where the controlled reduction of metabolic activity would allow fresh fruits to be held in storage for a long time. Too little is known about odorous emanations of various fruits to permit a maximum aroma being produced without impairing their keeping quality. In general, no significant results have been obtained by correlating chemical changes in the fruit during storage with specific storage treatments, with the exception of the proto-pectin to pectinic acid change, which is partly responsible for the softening of the fruit and which investigators try to retard.

1300. SMOCK, R. M. 664.85.11
Recent developments in the storage of apples.
Eighty-first A.R. Nova Scotia Fruitgrs' Ass. 1944, 1945, pp. 64-72.

An interesting disquisition on the advantages and disadvantages of farm stores and Central Refrigerated warehouses in Canada, and on the present position with regard to gas storage including the problems of ethylene, scald-producing gases and odours.

1301. ENGSTEDT, G. 664.85.11
Pomologiska Föreningens lagringstävlan. (**Apple storage competition in Sweden.**)
Fruktodlaren, 1945, No. 1, pp. 8-10.

A report on an apple storage competition arranged by the Swedish Pomological Society under the direction of the

Institute for Plant Research and Cool Storage, Nynäshamn. Each participant submitted about 75 kg. of fruit of which one-third was sent to Nynäshamn for immediate investigation and the rest into cool storage at +2-3° C. in Stockholm's free harbour. Maturity occurring early in 1944 the first storage test had to be made during the week of 11-16 December. Particulars are given of the standard by which the fruit was judged.

1302. JENNERUP, E. 664.85.11: 577.16
Undersökning angående C-vitaminhalten i lagrad frukt. **(The vitamin C content in stored apples.)**
Fruktodlaren, 1945, No. 2, pp. 62-5.

A number of culinary, table and dessert apple varieties were stored from 15 October to 5 March and determinations of the vitamin C content at these two dates and six other dates are recorded, the results being presented in three graphs and a table. Among the culinary varieties studied the ascorbic acid content of Wellington was least subject to fluctuations (content varying from 29·9 to 31·6 to 27·4 mg. per 100 g. during storage), Bramley showed the highest value in October (34·5 mg., decreasing to 26·3 mg. in March). From the point of view of vitamin C content Golden Noble was by far the best table variety (27·0 to 29·7 to 24·2 mg.), but also Blenheim remained on a fairly high level (19·8 to 23·4 to 20·1 mg.) while the loss in Allington was considerable (17·7 to 9·6 mg.). The ascorbic acid determinations in dessert varieties gave the following values: Ribston 11·8 to 17·6 to 13·5 mg.; Cox's Orange 14·1 to 16·4 to 11·1 mg.; Bodil Neergaard 8·3 to 12·4 to 7·8.—Alnarp.

1303. TROUT, S. A., AND HALL, E. G. 664.85.11.038
Extending the storage life of apples by the use of skin coatings.
Agric. Gaz. N.S.W., 1945, **56**: 64-5.

This progress report on skin coating trials with apples briefly discusses some preliminary results obtained with the following treatments: (1) The solution of castor oil and shellac in alcohol was very effective under cool conditions, but induced alcoholic flavours at higher temperatures. (2) Wax emulsions proved most effective for reducing weight loss, but the soap concentration necessary for their emulsification caused calyx injuries to certain varieties. (3) Emulsions of a heavy medicinal paraffin oil with a low concentration of soap were found to control wilting satisfactorily without producing a toxic effect on the fruit.—Coating should be applied immediately after picking, but not during hot weather.

1304. GRISWOLD, H. B. 664.85.653.038
Cellophane wrapped avocados.
Yearb. Calif. Avocado Soc. 1944, 1945, pp. 53-5.

Experience of a commercial scale trial over three seasons indicates that cellophane wrapping of avocadoes prior to shipment has three main advantages: (1) it doubles the time in which the fruit remains hard, (2) the fruit remains green during the softening period, (3) the fruit shows more resistance to extremes of temperature. The process of wrapping and its results are discussed.

1305. RAMSTAD, P. E., AND GEDDES, W. F. 664.84.655
The respiration and storage behavior of soybeans.
Tech. Bull. Minn. agric. Exp. Stat. **156**, 1942, pp. 54, bibl. 45.

A thorough study was made of some of the physical, chemical and biological factors influencing the relative keeping qualities of soybeans, which during the past few years have developed into a major crop in the central area of the United States. Hygroscopicity of samples stored at relative humidities of 35, 50, 60, 70 and 85% was found to average 6·5, 8·0, 9·6, 12·4, 18·4% moisture respectively as determined by the two-stage vacuum-oven method, soybean oil meals being somewhat more hygroscopic than whole beans. At a temperature of 37·8° C. the rate of respiration showed regular acceleration with increasing moisture content, when measured soon after conditioning the beans to various moisture levels. Storage for a few weeks at more moderate temperatures but at a moisture content above 13% caused increases in the respiratory rate of several 100% resulting from fungal and bacterial activity. Maximum viability was retained under conditions of about 10% moisture content and of a temperature as low as practicable. The effect of micro-organisms on chemical composition, the technical equipment used, the methods of determination employed and the phenomenon of heating during storage are discussed in detail.

1306. TAYLOR, C. F., AND SHANOR, L. 664.84.64: 631.4
***Pullularia pullulans* storage fruit spot of tomato.**
Phytopathology, 1945, **35**: 210-2.

A brief description is given of a spot disease of tomatoes, not previously recorded for this fruit, attributed to *Pullularia* (*Dematium*) *pullulans*. It was found in cold storage at West Virginia University, Morgantown.

1307. WINTER, J. D. 664.85.037+664.84.037
Quality in frozen fruits and vegetables.
Bull. Minn. agric. Exp. Stat. **362**, reprinted 1943, pp. 24.

A summary of investigations on the freezing of fruits and vegetables under conditions prevailing in the locker storage practice. The experiments have been carried out since 1936. The detailed recommendations relate to peaches, red and purple raspberries, strawberries, asparagus, cantaloup, cauliflower, lima beans, peas, rhubarb, green and yellow podded snap beans, soybeans, spinach and maize, and are presented under the following headings:—Relation between variety and quality, relation of storage temperature to quality, effect of different packing and freezing methods, effect of scalding materials on quality, sweetening materials, temporary storage of frozen products and general recommendations including the preparation of fruits and vegetables for freezing, the scalding time required, thawing the frozen product and fruit and vegetable juices.

1308. MACARTHUR, M.
664.84.31.037+664.85.75.037+664.84.67.037
Freezing of commercially packed asparagus, strawberries and corn.
Fruit Prod. J., 1945, **24**: 238-40, being *Contr. exp. Farms Serv. Ottawa* **583**.

Freezing by direct air blast on the product was the most rapid method. At 0° F. and an air velocity of 460 l.f.p.m. freezing took 16-25 min., and at —20° F. 15-16 min.

1309. LEWIS, S. E. 632.944
(1) **Methyl bromide as a fumigant: Determination in air.**
J. Soc. chem. Ind. Lond., 1945, **64**: 57-61.

PROCESSING AND PLANT PRODUCTS.

1310. CRUESS, W. V., AND OTHERS. 664.8
The food technology division.
Fruit Prod. J., 1945, **24**: 275-7.

An historical review of the activities of the Food Technology Division, University of California, since 1912, at which time the so-called "Zymology" occupied one small laboratory in the Fertilizer Control Building. The review includes brief reports of activities on the following lines: Instruction, frozen pack, dehydration and sun drying, fruit juices and concentrates, olive products, canning, wines.

1311. HEID, J. L. 664.84+664.85
A manual for fruit and vegetable processors [proposed].
Fruit Prod. J., 1945, **24**: 243-5, 248, 251-2, bibl. 16.

Discussion is invited on the tentative table of contents for a manual on fruit and vegetable processing outlined in this

article and comprising 61 chapters and an appendix. The handbook proposed would summarize our present knowledge on fruit and vegetable processing and would provide reference charts, diagrams and tables for the use of technologists.

1312. Atkins, C. D., Wiederhold, E., and Moore, E. L. 634.3-1.57: 577.16
Vitamin C content of processing residue from Florida citrus fruits.
Fruit Prod. J., 1945, **24**: 260-2, 281, bibl. 8, being *Contr. agric. chem. Res. Div.* **159**.
The peel and rag residues of 4 Florida orange and 2 Florida grapefruit varieties were found to contain, after juice extraction, about three-fourths of the total vitamin C content of the fruit, of which a high proportion is retained. The residue may therefore be regarded as a potential source of vitamin C. Data on the distribution of vitamin C in the fruit are tabulated.—U.S. Citrus Products Station, Winterhaven, Florida.

1313. Cruess, W. V., and others. 634.421 + 664.85.421
Experiments with guavas.
Fruit Prod. J., 1945, **24**: 263-6, 283, 285.
The guavas used in these experiments were provided by the varietal planting maintained at Riverside by the University of California. The results reported include data on the following subjects: Size and shape.—Ratio of core to flesh: the most favourable ratio, 1: 4·6, was found in the Turnbull variety.—Vitamin C content of fresh guavas: the vitamin C content of Rolfs is nearly ten times that of orange juice, whereas some varieties are not superior to citrus fruits. Where guavas are grown as a source of vitamin C, varietal differences in vitamin content should be taken into account. —Effect of freezing on vitamin C content.—Effect of canning on vitamin C content.—Moisture content and soluble solids: in general the guava has a moisture content similar to that of cling peaches and a dry matter content somewhat lower than apple.—Total acid: total acidity expressed as citric acid averaged 0·55 to 0·60 g./100g.—pH value: well below 4·5, so as to permit sterilization of canned guavas in boiling water.—Guava paste, a jelly confection.—Canning: guavas seem to be more suitable for sauce, paste, nectars and jam making than for canning.—Dehydration.—Freezing.—Blends with fruit juices.—Food Technology Division, University of California.

1314. Bacharach, A. L., and Coates, M. E. 635.1/7: 577.16
A note on day to day variations in the vitamin C content of bought and culled vegetables.
Chem. Industr., 1945, No. 2, pp. 10-1, bibl. 5.
Potatoes showed considerably less variation in their vitamin C content than turnips and 7 other vegetables and are therefore regarded as the most reliable source of vitamin C in the English diet. The experiments, from which this conclusion is drawn, were carried out on a limited scale.

1315. Wall, M. E., Kelley, E. G., and Willaman, J. J. 635.1/7: 577.16
Carotene concentrates from vegetable leaf wastes.
Industr. Engng Chem. (*industrial edition*), 1944, **36**: 1057-61, bibl. 12.
Properly collected and dried vegetable leaf wastes have a very high carotene content, ranging from 300 to 700 micrograms per gram. The paper describes and compares various methods of carotene extraction and purification of the extract.—Eastern Regional Research Laboratory, Phil.

1316. Anon. 635.13: 581.192
Carotene and sugar content of carrots.
Nature, 1945, **155**: 613-4, bibl. 6.
The nutritional value of carrot roots is due largely to their content of carotene and sugar found most abundantly in the phloem, the proportion of phloem being greatest in young roots. Carotene content is influenced by manuring and its losses during storage are negligible until the stored roots begin to sprout. An unidentified bitter constituent may upset the correlation between desirable taste and refractive index of the juice when sugar content is assayed as a test of quality. High sugar-containing stocks replanted for seed often rot; and at temperature of over 70° F. initiation of flower primordia may be inhibited. Carrots in sand culture supplied with a complete nutrient solution and cow manure free from urine did not fork, but the addition of cow or horse urine caused forking as did ammonium hydroxide and ammonium carbonate. Growth substances did not cause root branching.

1317. Matiesen, D. 633.813(474.2)
Något om den estniska muströrelsen. (**Fruit juice production in Esthonia.**)
Fruktodlaren, 1945, No. 2, pp. 70-1.
The development of the fruit juice industry in Esthonia is described. Starting in 1935 with two plants capable of producing 12,000 litres it had reached an output of 600,000 litres in 1939.

1318. Engstedt, G. 663.813
Musterilokalen, dess läge och beskaffenhet. (**A fruit juice extraction plant, its position and lay-out.**)
Fruktodlaren, 1944, No. 4, pp. 136-9.
The instructions for the erection of a fruit juice extraction plant are accompanied by a detailed ground plan, scale 1: 100.

1319. Anon. 663.813: 635.31
Process for production of asparagus juice concentrate.
Fruit Prod. J., 1945, **24**: 267-70, being reprint of *Circ. West. Reg. Res. Lab.* AIC-**70.**
Asparagus juice concentrate, the production of which from cannery and packing-house waste is fully described, is a suitable medium for the culturing of useful micro-organisms.

1320. Poe, C. F., and McGuire, E. G. 663.813: 635.64: 577.16
A comparison of the vitamin B_1 content of home canned and commercially canned tomato juices.
Fruit Prod. J., 1945, **24**: 200-1, 217, bibl. 13.
The average vitamin B_1 content of home-canned tomato juice is reported as 76·8 units per lb. as against 90·6 and 101·4 units found in previously analysed commercial juices. There was no difference in vitamin content between filtered and unfiltered juice.—University of Colorado.

1321. Mangat, S. S. 663.813: 634.3
Determination of sodium benzoate in preserved citrus juices and squashes.
Ind. J. agric. Sci., 1944, **14**: 319-21, bibl. 3.
The official A.O.A.C. method for the determination of benzoic acid is shown to be inaccurate for preserved citrus juices and squashes. A modified method is described in which the samples are placed in a long column and extracted for four hours. The formation of emulsion is avoided. The results obtained by this method are far more accurate and are not subject to variation due to change of concentration. [Author's summary.]

1322. Boyd, J. M., and Peterson, G. T. 663.813: 634.3
Quality of canned orange juice.
Industr. Engng Chem. (*industrial edition*), 1945, **37**: 370-3, bibl. 12.
The authors' recommendations include the following points: After washing and sorting, the fruit should be given a hot water treatment of 1-2 minutes (180-185° F.) to wilt the peel and thereby reduce the amount of oil extracted. An extractor should be used, which can be operated so that little

oil (0·010% or less is most desirable) from the peel enters the juice. The juice should be immediately deaerated under suitable vacuum as determined by the juice temperature. The juice should be flash-sterilized using high-temperature, short-time pasteurizers, heating to 225-240° F. in a few seconds, and immediately cooling to approximately 185° F. After flash sterilization the juice should be filled into cans with the minimum amount of reaeration during filling and closed with as complete exclusion of head-space air as possible. The filled cans should be held only long enough to ensure sterility of the can and then rapidly water-cooled to 100° F. or lower. The canned juice should be stored at the lowest temperature economically practical until consumed.

1323. BERGERET, G., AND IBARRA, H. T. 663.3
Sidras de consumo en el Uruguay. **(Cider in Uruguay.)**
Reprinted from *Rev. Fac. Agron. Montevideo* **35**, 1944, pp. 14, bibl. 11.
The analyses are given of 8 bottled ciders from various sources including 2 from Uruguay and 1 from England.

1324. JOHNSON, C. M. 664.84.047
Determination of water in dry food materials.
Industr. Engng Chem. (*analytical edition*), 1945, **17**: 312-6, bibl. 16.
The application of the Fisher volumetric method for the determination of the moisture content of dehydrated vegetables and a few other food materials.—Western Regional Research Laboratory, Albany, Calif.

1325. CRUESS, W. V. 664.84.047
Fourth dehydration conference at the University of California.
Fruit Prod. J., 1945, **24**: 195-7, 217.
A summary of 8 papers read in January 1945 before the fourth Dehydration Conference at the University of California. (1) L. K. Mann (College of Agriculture, Davis), *Truck crops studies*: A progress report on the study of water core of carrots, by which the Red Core Chantennay is much more severely affected than the Imperator variety. The effect of variety and cultural practices on the keeping quality of onions is also under investigation.—(2) G. Mackinney (College of Agriculture, Berkeley), *Current sulfiting problems of dehydrated vegetables*. The lower the moisture content of the dried vegetable the less SO_2 is required to keep it in good condition in storage. Sulphiting prolonged the storage life and protected the carotene of dehydrated carrots. Methods of sulphiting carrots, cabbage and potatoes are discussed.—(3) T. E. Weier (College of Agriculture, Davis), *Recent microscopical studies* (*on carrots*).—(4) L. B. Howard (Western Regional Research Laboratory, Albany), *The significance of moisture content in dehydrated vegetables*: The protective effect of low moisture content on storage life is indicated by data on cabbage, which, at 100° F., became inedible in 140, 60 and less than 20 days at 2·3, 3·6 and 6·7% moisture respectively. A moisture content of 2-2·5% was attained by using desiccated air, calcined lime (CaO) serving as desiccant.—(5) R. H. Vaughn (College of Agriculture, Berkeley), *A microbiological survey of the dehydration process*: Causes of souring and sources of infection are discussed, including prevention.—(6) E. O. Essig (College of Agriculture, Berkeley), *Summary of work on insects in stored food products*: Although tin and glass containers are still unrivalled, properly built heavy cartons, double-dipped in Dewey and Almy thermoplastic wax have given excellent protection against insects.—(7) L. A. Hohl and H. F. Friar, *New diced vegetable products*.—(8) H. J. Phaff (College of Agriculture, Berkeley), *Fruit drying in vegetable dehydrators*: In wartime, vegetable dehydrators should be used from about 1 July to 15 September for drying peaches and apricots. Grapes should be sulphured and not steamed previous to dehydration.

1326. CRUESS, W. V., FRIAR, H. F., AND VAN HOLTEN, P. 664.85.047
Dried, syrup treated fruit.
Fruit Prod. J., 1945, **24**: 241-2, 247.
A report on a joint project of the Office of the Quartermaster General, U.S. Army, and the University of California. Methods are described for the production of steamed syrup-impregnated, dehydrated (2·0-2·4% moisture) fruits for eating out of hand as candy. The fruits found suitable for the treatment and believed likely to find a market are: Sweet cherries, apricots, clingstone peaches, Elberta and J. H. Hale peaches, pineapple, Bartlett pears and Kadota figs. It is recommended that small-scale trials with the product should be started with dehydrators equipped with steam.

1327. HEBERLEIN, D. G., AND CLIFCORN, L. E. 664.84/85.047: 577.16
Vitamin content of dehydrated foods. Effect of packaging and storage.
Industr. Engng Chem. (*industrial edition*), 1944, **36**: 912-7, bibl. 24.
Gas pack samples (N or CO_2) of a number of dehydrated vegetables and fruits showed a higher retention of vitamin C and carotene than ordinary packs, particularly at temperatures not exceeding room temperatures, at which also thiamine proved fairly stable in tomato flakes and carrots. Riboflavin was stable under all conditions. Additional drying to a very low moisture content had no effect on vitamin retention.

1328. CULPEPPER, C. W., AND OTHERS. 664.84.62.047
Dehydration of pumpkin and winter squash. A comparative study of forty-two varieties.
Fruit Prod. J., 1945, **24**: 170-7, 189, 202-8, 215, bibl. 29.
The suitability and comparative quality for dehydration was determined of 12 varieties of *Cucurbita pepo*, 9 varieties of *C. moschata*, and 21 varieties of *C. maxima*. Drying was begun at 160° F. and finished at 140° F. Dry yields, which were found to be related to the total solids content, were highest from squashes (*C. maxima*), while those from *C. pepo* varieties were intermediate and those from *C. moschata* varieties lowest. Losses in preparation were lowest in soft-shelled varieties which can be lye-peeled. Ascorbic acid content of the fresh material varied from 23·3 mg./100 g. in Delicious to 2·48 mg. in Golden Cushaw, more than half of the varieties exceeding 10 mg. High and low ascorbic acid was correlated with high and low total solids respectively. The effect of various treatments on flavour, colour, vitamin retention and storage quality is discussed. Two lists show the position held by each variety in comparative tests of desirability for dehydration purposes. When all factors, including productiveness, ease of preparation and dry matter content, were taken into consideration, Golden Delicious ranked highest with Boston Marrow and Banquet second and third.

1329. PILCHER, R. W. 664.84/85.036.5: 613.2
The first year's findings in the NCA-CMI nutrition program.
Fruit Prod. J., 1945, **24**: 271-4, bibl. 7.
A summary of 7 papers reporting the first year's findings of extensive tests initiated by the National Canners Association and the Can Manufacturers Institute to collect accurate information on the nutrition value of canned goods. The results of vitamin assays, as far as they relate to fruits and vegetables, are briefly summarized as follows: "The ascorbic acid (vitamin C) and carotene (provitamin A) analyses were performed at the Arizona Agricultural Experiment Station. Canned orange juice and grapefruit juice proved to be the best sources of ascorbic acid (averaging 39·4 and 33·8 mg. per 100 ml., respectively). Grapefruit segments packed in syrup were also found to be a rich

source (averaging 24·6 mg. per 100 gm.). Other products important in ascorbic acid content were tomatoes, tomato juice, asparagus (both green and white), and spinach, ranging in average values from 16·5 to 11·4 mg. per 100 gm. The richest sources of carotene proved to be carrots, spinach and apricots. Other products which have a substantial carotene content are prunes, tomatoes and tomato juice. The determinations of thiamine and niacin, two of the vitamins in the B complex, were made at the University of Wisconsin. It was found that peas and asparagus were, among the vegetables, the best sources of thiamine, while among the fruits, pineapple slices and orange juice were found to be fair sources of this vitamin. However, the tests reaffirmed the fact that fruits and vegetables, raw or canned, are not richly endowed by nature with thiamine. In the amounts usually or conveniently consumed, vegetable and fruit products, such as peas and peaches, also [i.e. as well as fish] contribute substantial amounts of niacin to American diets. The ' B ' vitamins, riboflavin and pantothenic acid, were determined by the University of Texas Biochemical Institute Laboratories. Asparagus, peas and corn were found to be fair sources of pantothenic acid, while asparagus, peas and spinach were rich amongst the vegetables in riboflavin content." The assay values obtained in the tests are assembled in a table. The distribution of water-soluble vitamins and vitamin retention during preparation for the table are also discussed.

1330. ADAM, W. B. 664.84.036.5
Corrosion and hydrogen swells in canned vegetables.
A.R. Campden Fruit Vegetable Pres. Res. Stat. 1944, 1945, pp. 37-45, bibl. 5.

Observations on commercial packs of canned vegetables that hydrogen swells may form in canned beetroot in the third year of storage under normal conditions in England, and that losses in canned stringless and runner beans may occur in cans 3 to 4 years old, and, further, that hydrogen swells are seldom found in canned peas or any vegetables packed in plain cans, have been confirmed by trials.

1331. ADAM, W. B.
577.16: 664.84.21.036.5 + 664.84.656.036.5
Vitamin C content of canned potatoes and canned peas.
A.R. Campden Fruit Vegetable Pres. Res. Stat. 1944, 1945, pp. 20-7, bibl. 11.

It was found that the average ascorbic acid content of commercial packs of potatoes falls from about 10 mg. per 100 g. in late autumn to about 3 mg. per 100 g. in the early summer packs of old potatoes. The average ascorbic acid content of commercial cans of green peas was about 9·2 mg., ranging actually from 2 to 13 mg. per 100 g.

1332. FABIAN, F. W., AND HONTZ, L. H. 664.84.842
Preservation of red mango pepper hulls.
Fruit Prod. J., 1945, **24**: 198-9, being *J. Art. Mich. agric. Exp. Stat.* **744**.

Of the three methods of preserving sweet red pepper hulls tested, covering them with a 70° salometer brine and adding 15 lb. of dry salt per 100 lb. of hulls gave the best results, all yeasts and bacteria having disappeared at the end of the first week without previous fermentation. Hulls only partly mature at the time of salting were found to be more liable to spoilage than mature hulls. The quality of the finished product was also determined by the variety used.

1333. FABIAN, F. W., AND WADSWORTH, C. K.
664.84.035.2
Salting beets, carrots, corn, green beans and spinach.
Fruit Prod. J., 1945, **24**: 231-7, 247, bibl. 6, being *J. Art. Mich. agric. Exp. Stat.* **745**.

In view of the shortage of canning materials salting appears to be the cheapest and safest, if not the only way of preserving large quantities of vegetables. It was the object of this investigation to work out a method of salting which would result in the best flavour. The data presented in extensive tables show that (1) blanching for enzyme destruction previous to salting is necessary, (2) a brine of 18% salt is most suitable for green snap beans, carrots, spinach, beets and maize, (3) dicing in about ½-in. cubes previous to blanching is the best treatment for carrots, (4) beets should remain whole, unblanched and unpeeled, (5) the flavour of salted maize, beans, carrots and spinach compared favourably with vegetables from the same lots which had been canned at the time of salting, (6) there is no advantage in adding acetic acid to the brine (except with carrots, 0·3%), (7) ascorbic acid losses are very considerable irrespective of the method applied, while carotene losses are less.

1334. DEVONSHIRE, C. R. 633.73-1.563.2
Effects of drying on the liquor of coffee.
Mon. Bull. Coff. Bd, Kenya, 1945, **10**: 17.

The Liquoring Board endeavours to rectify the impression held by certain Kenya planters that under-dry coffee will obtain a better classification than thoroughly dry parchment. The best method of drying coffee, consisting in sun drying on tables, is described.

1335. DUNNING, J. W., AND LATHROP, E. C. 633/635-1.57
The saccharification of agricultural residues. A continuous process.
Industr. Engng Chem. (*industrial edition*), 1945, **37**: 24-9, bibl. 17.

It is estimated that 100 million tons of farm wastes might be available annually for industrial purposes in the U.S. with an equal amount left on the farms for ploughing in. The new methods of saccharification of these residues described achieve an almost quantitative separation of pentosans and cellulose, which yield 15-20% xylose solution and 10-12% dextrose solution respectively.—Northern Regional Research Laboratory, Peoria, Ill.

1336. ALBANESE, A. A., AND OTHERS. 581.192
(21) **Amino acid analysis of some common vegetables. Method for carbohydrate-free extraction of nitrogen from fresh vegetables.**
Industr. Engng Chem. (*analytical edition*), 1944, **16**: 609-11, bibl. 21.

BASTET, M. A. 634.8: 665.81
Sur l'emploi des sarments de vigne comme source d'énergie pour les moteurs à combustion interne. (**The use of vine shoots as a source of energy for internal combustion engines.**)
Reprinted from *Ann. Inst. agric. Serv. Rech. Exp. agric. Algér.*, Aug. 1942, Fasc. 2, pp. 29.

BRADFIELD, A. E., AND PENNEY, M. 633.72: 581.192
The chemical composition of tea. The proximate composition of an infusion of black tea and its relation to quality.
J. Soc. chem. Ind. Lond., 1944, **63**: 306-10.

DICKINSON, D. 664.8.036.5
The determination of tin in canned food.
A.R. Campden Fruit Vegetable Pres. Res. Sta. 1944, 1945, pp. 46-51, bibl. 1.

DICKINSON, D. 664/85/85.036.5
The internal corrosion of cans. Progress report II.
A.R. Campden Fruit Vegetable Pres. Res. Sta. 1944, 1945, pp. 28-36, bibl. 2.

FISCHBACH, H. 664.84.047
Vapor pressure measurements as an index to moisture in dehydrated vegetables.
J. Ass. off. agric. Chem. Wash., 1945, **28**: 186-91, bibl. 4.

HIRST, F., AND ADAM, W. B. 664.84.21.036.5
The processing and laboratory examination of canned potatoes.
Chem. Industr., 1945, No. 12, p. 91, bibl. 9.

JONES, E. E. 664.84.047
Disposal of waste waters from the preparation of vegetables for drying.
J. Soc. chem. Ind. Lond., 1945, **64**: 80-3.

JUMP, J. A., ZAROW, A. I., AND STARK, W. H. 664.84.22.047
Dehydrated sweet potatoes for ethanol production.
Industr. Engng Chem. (*industrial edition*), 1944, **36**: 1138-40, bibl. 5.

KREHL, W. A., AND STRONG, F. M. 577.16
Studies on the distribution, properties, and isolation of a naturally occurring precursor of nicotine acid.
J. biol. Chem., 1944, **156**: 1-12, bibl. 8.

LUCAS, E. H. 577.16: 581.192
Determining ascorbic acid in large numbers of plant samples.
Industr. Engng Chem. (*analytical edition*), 1944, **16**: 649-52, bibl. 7.

MCRARY, W. L., AND SLATTERY, M. C. 581.192
The colorimetric determination of fructosan in plant material.
J. biol. Chem., 1945, **157**: 161-7, bibl. 12.

NEVIN, C. S., AND MOTTERN, H. H. 634.11-1.57
Production of quality apple butter with good yield.
Fruit Prod. J., 1945, **24**: 228-30, 253.

NEWTON, W., AND JONES, W. 664.85.11.037
The fluorescence of frozen potato tuber and apple friut tissue under ultra-violet light.
Canad. J. Res., 1945, **23** (Sec. C), pp. 76-8, bibl. 4.

NIELSEN, J. P., AND BOHART, G. S. 581.192
Determination of crude lipid in vegetable matter.
Industr. Engng Chem. (*analytical edition*), 1944, **16**: 701-3, bibl. 4.

NOTT, G. A. 634.11-1.57: 663.813
Apple juice—an answer to the cull apple problem.
Vegetable and Fruit Growers' Conferences. Littlebury & Co. Ltd., Worcester, England, 1945, pp. 54-6.

PEPKOWITZ, L. P. 577.16
Some observations on the photochemical destruction of carotene.
J. biol. Chem., 1944, **155**: 219-25, bibl. 7, being *Contr. Rhode Island agric. Exp. Stat.* **660**.

RHODES, W. E., AND DAVIES, A. F. 664.84.21.036.5
The selection and pre-processing of potatoes for canning with special reference to control of texture by calcium chloride.
Chem. Industr., 1945, No. 21, p. 162-3.

SOBEL, A. E., MAYER, A. M., AND KRAMER, B. 577.16
New colorimetric reaction of vitamins D_2 and D_3 and their provitamins.
Industr. Engng Chem. (*analytical edition*), 1945, **17**: 160-5, bibl. 4.

DE SOROA, J. M. 663.25
Vinificacion. **(Wine making.)**
M. Marin y G. Campo, Muñoz Seca 4, Madrid, 2nd edition, 1943, pp. 248.
Winemaking in Spain.

STEINER, E. T., AND GUTHRIE, J. D. 633.492: 581.192
Determination of starch in sweet potato products and other plant materials.
Industr. Engng Chem. (*analytical edition*), 1944, **16**: 736-9, bibl. 10.

NOTES ON BOOKS AND REPORTS.

1337. AIYER, A. K. Y. N. 633(54)
Field crops of India.
Govt Press, Bangalore, 1944, pp. 552, 15 rupees.

A complete guide to agriculture as practised in India is presented, and there is no doubt it should prove of considerable value, particularly in view of the detail in which each of the numerous crops is considered. No similar book dealing with Indian products is available that incorporates, as is here done, the results of modern research and methods, and though departmental handbooks on certain crops may be available, they are few. Fifty-eight crops are discussed under such different headings as: grains, pulses, oilseeds, condiments, spices, fibres, drugs, narcotics, dyes, medicinal crops, etc. The so-called plantation crops, tea and coffee, are included under narcotics, but the author explains that he has followed the classification of the Official Crop and Season Reports. Vegetable crops have been excluded, even when grown on a field scale, on the ground that they are perishable; and fruits also are not considered. The treatment of each crop follows a uniform plan. As detailed a description as possible of the methods of cultivation is given and rotations, irrigation, drainage, manuring, pests and diseases, harvesting, preparation and marketing, and the botany and chemistry of the crop are all examined. The methods of cultivation described are mainly those prevailing in Mysore State, where the author was formerly Director of Agriculture. There is a small glossary of the vernacular terms used in the text and at the head of each section are given the vernacular names in several Indian tongues of the crop under discussion. The illustrations, some of which seem vaguely familiar, suffer somewhat in reproduction, but that is a minor point. The book as a whole is an excellent production and the print large and clear. It should certainly be in every agricultural library.

1338. ALLWRIGHT, W. J. S. 634.3(68): 658.8
The controlled marketing of citrus fruit in South Africa.
Publ. Univ. Pretoria Ser. 1, Agriculture **50**, 1945, pp. 226.

Orange trees were apparently introduced into South Africa in 1654. Exports of citrus started in 1906 and increased to such an extent that in the three years 1937-9 they amounted to 74%-75% of the total crop. The remainder, nearly all cull fruit, was sold on the local market, normally at a loss. Prices for export fruit dropped after 1925. In 1939 with the outbreak of war the need for a Citrus Board was strongly urged and in 1941 the Board having been formed was vested with effective powers to undertake the reorganization and marketing of citrus fruits in the Union. The author of this memorandum tells of the Board's achievements and provides in diagrams, tables and factual statements an extremely useful basis on which to decide whether and in what form control measures should be retained as a permanent feature of post-war citrus marketing in S. Africa. The work should be of the greatest interest to all who are concerned in economic marketing of staple fruit of all kinds on a large scale.

1339. BARNES, H. 634/635(943)
*The Queensland agricultural and pastoral handbook Vol. II. Horticulture.**
Issued by the Queensland Department of Agriculture and Stock, Brisbane, 1940, pp. 386, 4s.
This book, which has only recently come to our notice and which is, alas, now out of print, will have the strongest appeal to horticulturists in subtropical or tropical lands. It is greatly to be hoped that it will be reprinted. It is well printed, illustrated and indexed and affords a mass of practical information on important points in the cultivation from start to finish of banana, pineapple, citrus, papaw, passion fruit, granadilla, cherimoya, Queensland (or Macadamia) nut, pecan, avocado, strawberry, apple, plum, pear, peach, apricot, grapevine, with shorter notes on a number of other fruits.
The home manufacture of fruit juices and wines is described. Cultivation hints are given on 27 types of vegetable or herbs. Finally, a most valuable section of 130 pages is devoted to post-harvest operations. Here the detailed construction of a packing house is set out with ample illustrations. Standard packs are described and again in great detail the packing of the following fruits and vegetables:—banana, pineapple, citrus, papaw, cherimoya, strawberry, avocado, grapes, apples, stone fruits, lettuce, melons and tomatoes.

1340. BROOKLYN BOTANIC GARDENS. 635.9
Plants and gardens.
1945, Vol. 1, No. 1, new series, pp. 65.
The first number of the new series of *Plants and Gardens*, a quarterly publication issued by the Brooklyn Botanic Gardens, U.S.A., contains a number of well-illustrated articles of considerable value to amateur and professional gardeners. That by C. F. Doney, entitled Shrubs for special uses, gives names and descriptions of a large number of ornamental shrubs for various soils and situations and hardy in the Brooklyn district [which might do equally well in English gardens.—ED.]. Weed-killing chemicals, by G. S. Avery, Jr., deals with the latest discoveries, and Why house plants fail, by M. Free, describes ways of overcoming the rapid decline of plants under American living-room conditions.

1341. THE FARMERS' CLUB. 63: 016
A classified list of books
[of the Farmers' Club Library, 3 Whitehall Court, London], 1945, pp. 44.
To anyone engaged in one of the branches of British agriculture this list of books on different agricultural subjects will prove interesting. It does not, however, pretend to be anything but a catalogue of books in the library and should be regarded as such, rather than a comprehensive list of books on particular subjects, which it is not.

1342. GILMAN, J. C. 582.81/88: 631.4
A manual of soil fungi.
The Collegiate Press Inc., Ames, Iowa, 1945, pp. 392, bibl. 169, $5.00.
Although this book is unlikely to be of great interest to the horticulturist as such, it should prove valuable to the mycologist or plant pathologist who is particularly concerned with the fungi of the soil. Many fungal families and species are described but the work is confined to those species which have actually been isolated from the soil, a limitation which unfortunately necessitates the exclusion of many important plant pathogens. The descriptions are in most cases abstracted from the work of authors who have specialized in each group and keys are given for the identification of the families, genera and species, although these keys appear in some cases to be rather incomplete or misleading. Somewhat diagrammatic illustrations are given of most of the important genera and there is a useful bibliography and glossary of technical terms. W.G.K.

* We are informed by the Office of the Agent General for Queensland, London that this work is now out of print.

1343. GRÜNBERG, I. P. 634.1/8-1.542
Le poda de los frutales. **(The pruning of fruit trees in Argentina.)**
B. Aires, 1941, 2nd edition, revised, pp. 334, 8 dollars.
A comprehensive, illustrated treatise on the pruning and training of deciduous fruit trees and of citrus and olive.

1344. GRÜNBERG, I. P. 634.1/8-1.541
El arte de criar e injertar frutales. **(Raising, budding and grafting fruit trees.)**
Libreria El Ateneo, Buenos Aires, 4th edition, revised, 1944, pp. 243, 7 dollars.
A comprehensive treatise on budding and grafting, and the raising of fruit trees. Part I deals with general principles, part II with particular fruits including all the more popular temperate, sub-tropical and tropical varieties.

1345. JOHN INNES HORTICULTURAL INSTITUTION. 634/635
Answers to growers.
John Innes Bulletin **1**, 1945, pp. 60, Merton, London, S.W.19, 2s. 6d.
We commend to the favourable attention of our readers this new publication, in which the fruit and glasshouse grower is brought to close grips with research work of immediate practical importance and informed as to possible solutions to many of his worrying, everyday problems. For separate articles see separate abstracts.

1346. ROBINSON, D. H. (Editor). 635.1/7 + 634.1/7
Vegetable and Fruit Growers' Conferences.
Littlebury & Co. Ltd., Worcester, England, 1945, pp. 64, 6s.
This useful publication contains the papers with notes of discussions thereof given by various experts and growers at a conference held at Worcester on 4 and 5 December, 1944. Most of the papers are abstracted separately.

1347. CONGRÈS NATIONAL POMOLOGIQUE, PARIS. 634.1/7
Papers on pomological subjects.
Rev. hort. Paris, 1943, **115**: 356-382.
Summaries are given of 37 papers on pomology read at the Congrès National Pomologique held in Paris, 30 September to 2 October, 1943. One has been abstracted (see *H.A.*, 15: 995).

1348. COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, AUSTRALIA. 633/635 + 664.84/85(94)
Eighteenth Annual Report C.S.I.R. Aust. for year ended 30th June 1944,
1945, pp. 78, 3s. 4d.
Plant Investigations. Fruit investigations. In apple rootstock trials at Stanthorpe, Qd, now established for 8 years, Granny Smith and Jonathan have done much better on certain stocks, notably Merton 789 and 793 (both immune to woolly aphis), than on Northern Spy. Four Malling pear rootstocks which propagate well from layers are found compatible with Williams, though Williams has shown greater vigour when propagated on *Pyrus calleryana*. Plum rootstock work continues. At Griffith, N.S.W., citrus rootstock trials continue. Inarching declining trees with young rootstocks has not yielded positive results. *Drug plant investigations.* Among drugs—and the relevant drug-producing plants—under investigation are the following:—hyoscine and atropine, opium alkaloids, quinine, ephedrine, santonin, pyrethrum. *Vegetables.* Attention is focused on the development of suitable varieties for large-scale production and processing. A seed production trial of 21 varieties planted on 6 occasions over a 12-month period at Lawes, Southern Queensland, was not very successful, possibly owing to difficult weather conditions between flowering and harvest. *Rubber plants.* Experience shows that the potential growth period of guayule at Canberra is limited to the 6 summer months and during this

period adequate moisture is essential. Seed is now to be tried at Lawes in Southern Queensland. The problem of field establishment of guayule is being studied at the Waite Institute, S. Australia. As regards kok saghyz, the difficulty lies in its field establishment. Germination trials show that at 18° C. it needs a soil moisture content equal to field capacity or more for 7 to 10 days. The rate of germination of new seed is much increased by pre-soaking in a $\frac{1}{2}$ molar solution of KNO_3 for 4 days at 17° C. Contact with superphosphate in the soil decreases germination. In general it demands a high degree of soil fertility for good growth. Preliminary attempts to produce polyploids by colchicine have been promising. Seed production is being studied. Field grown roots average about 14% rubber in dry weight. Growth of *Asclepias erosa* was not successful. *Entomological Investigations.* Insect control of St. John's wort and of *Lantana* is under study. Other horticultural pests under investigation include the potato moth (*Gnorimoschema operculella*), cabbage butterfly (*Pieris rapae*), green vegetable bug (*Nezara viridula*), citrus red scale (*Aonidiella aurantii*), brown olive scale (*Saissetia oleae*) and light brown apple moth (*Tortrix postvittana*). *Irrigation Settlement Investigations.* 1. *Merbein.* Spraying vines with oil for frost protection delayed bud burst a fortnight, but had a cumulative serious effect on yield after several years' treatment. Harvesting machinery has been suitably modified to harvest the poppy crop and further alterations should fit it for harvesting pyrethrum. Fruit processing work continues with sultanas, peaches, prunes and apples. 2. *Griffith.* Cover crop trials under peach and citrus trees continue. Vegetable irrigation is receiving special attention. Drainage and the reclamation of salt land are under study. Soil reconditioning of old orchards is being investigated. *Food Preservation Investigations. Canning and fruit products.* Work is noted on tomatoes, pears and fruit juices, especially citrus. *Dehydrated vegetables.* Investigations are in progress on factors affecting the initial quality and the storage life of dehydrated vegetables. *Fruit storage.* Of skin coatings castor oil and shellac was generally the most effective for apples, considerably increasing the storage life of Jonathan and other apples in ordinary store. Skin coatings for vegetables are also under trial. The application of sodium metabisulphite dust was the best method of re-sulphuring apple rings. Improved methods of dehydrating pears, apricots and peaches are being worked out. *Staff.* A full list of Council Staff is given on pp. 69-74.

1349. GEORGIA. 634/635(758)
Fifty-sixth Annual Report of Georgia Experiment Station, 1943-44,
pp. 91.

Short notes on numerous projects. Of crops cotton and peanuts receive most attention. Among peanut problems under investigation are the following:—The effect of fertilizers on diseases, breeding, seed treatment and spacing, leaf spot control, protein content, processing and products. Work continues on soil and water losses from various systems of management in a peach orchard. Three pages are devoted to the activities of the Georgia Mountain Experiment Station, where work is in progress on the production of superior quality vegetable crops.

1350. IDAHO. 635.1/7(796): 631.531
Fifty-first Annual Report of Idaho Agricultural Experiment Station for year ending June 30th, 1944,
1944, pp. 63.

The most interesting feature in this report is the note on the initiation of a co-operative study of vegetable seed problems. The development of vegetable seed production in Idaho has been extremely rapid in the last few years, a programme of research having been initiated in 1937. Most of the work has been done at the Parma Branch Station. In 1943 a specialist of the U.S. Department of Agriculture was assigned to collaborate. Among projects are manurial irrigation trials of the major crops grown for seed.

1351. INDIAN TEA ASSOCIATION. 633.72(54)
Annual Report Indian Tea Association, Scientific Department, Toklai for 1940,
1941, pp. 21.

In this report, which has just come to hand, notes are given on current research projects in 1940. For abstracts of previous and subsequent reports the reader is referred to *H.A.*, 11: 1029, 13: 343 and 14: 1029.

1352. IOWA. 633/635(777)
Report on agricultural research of the Iowa Agricultural Experiment Station for the year ending June 30, 1944.
Part I, pp. 298; Part II, pp. 92.

Part II concerns the Corn Research Institute. Part I contains short notes on many projects of interest to horticulturists, a few of which are noted below. Soilless culture of roses and snapdragon, hardy apple rootstocks, Hibernal, Virginia Crab and Dolga Crab proving the best for standards and Clark's Dwarf for dwarf trees. A special project concerns stock-scion influence in apples. Soil management for apples. Apple, pear and plum breeding. Peach breeding for hardiness. Breeding and testing rose stocks. Refrigerated locker storage of fruit and vegetables. Gas storage of fruit. Home dehydration of fruit and vegetables. Sweet potato storage. Manuring of sweet potatoes and melons. Onion breeding.

1353. JAMAICA. 634/635(72.92)
Annual report of the Department of Agriculture, Jamaica, for the year ended 31st March 1944,
1945, pp. 16.

Numerous trials were carried out with varying success on different crops. *Banana leaf spot.* A study was made of the effect of climatic conditions on the viability of conidia produced on spots in one locality throughout the year showing that the low night temperatures of the cooler months cause a slowing down of conidia development and a high mortality in the germinating spores and a retarding in growth of the germ tubes. This explains the comparatively healthy foliage obtaining in March and April. The rate at which spots appear on a leaf is shown to be directly proportional to the intensity of infection per unit area of leaf surface, a heavily infected part of a leaf forming the individual spots very much faster than one lightly infected. It is explained how this fact can assist in the interpretation of records of disease intensity at any time of the year. The presence of a toxin secreted by the primary infection hyphae while developing intracellularly after penetration of the stomata is considered proved. The effects of this toxin on the breakdown of leaf resistance are mentioned. It is shown that January and February are the safest months to forego spraying without any loss of control. *Citrus field experiments.* Manurial experiments with grapefruit, which have been in progress for 8 years on *terra rossa* soil, indicate that the optimum manure is a single level application of N and K. It produces an average increase of 2·9 boxes per tree per annum or, over the period, a gross return of 1,000% on the capital invested in manures. On acid clays of alluvial origin a combination N2, P2 and K2 gave 4·88 boxes per tree per annum, compared to 1·83 for the unmanured control, though N1P2K1 was nearly as effective and more economical. Grapefruit juice proved a good indicator of potash and nitrogen requirements. Trees with 1,110 p.p.m. K_2O in the matured fruit juice are unlikely to respond further to potash manuring. Potash manures result in decreased nitrogen in the juice. This work is being extended. *Coconut.* Bronze leaf wilt has appeared on the north-west coast and pending conclusive information as to its nature it is to be treated as infectious and the trees showing symptoms destroyed. *Avocado cold storage.* In

trials at 42° and 45° F. varieties of the West Indian race and crosses between this and the Guatemalan race all showed symptoms of internal breakdown, though Lula showed only 1% and Collinson 11%, whereas the Mexican race and Mexican × Guatemalan varieties were unaffected. *Mango and cacao budding.* Haden mango is more easily budded than St. Julian and as easily budded as the Bombay. Mango and cacao budwood kept and budded well after 10 days' storage in damp moss, but St. Julian mango budwood and the patch budwood of cacao would not lift and could not be used. With stored budwood better results were obtained when the wood at the back of the bud was removed. *Castor oil.* A large acreage was planted, spread out over the island. Yields were low and varietal difference seems to be important.

1354. MACAULAY INSTITUTE. 631.4: 633/635
Annual Report of the Macaulay Institute for Soil Research 1943-44,
pp. 27.

Investigations have been continued on peat soils and soil organic matter. Tests of a commercial growth-promoting medium under exact control at the institute and under market garden conditions on a commercial scale, under glass and in the open gave no evidence of any increase in growth resulting from its use. Tests have shown the great value of peat interlaid in a rich garden compost heap at the rate of 1 part peat to 4 parts refuse by volume for preventing loss of nutrients, which is normally very large. Previous results on the successful replacement of farmyard manure by peat fortified with artificials have been confirmed. In spectrographic investigations the technique used in the cathode layer arc method has been further developed. The Lundegårdh method has again been used for routine work and various refinements have been found possible. An appendix contains Logarithmic Tables for use in quantitative spectrographic analysis. C. Table of $(\delta\text{-}\gamma)$ for values of δ, where γ is the subtraction logarithm of δ.

1355. MINNESOTA. 633/635(776)
50th Annual Report of Minnesota Agricultural Experiment Station 1942/43,
1943, pp. 31.

The report consists of lists of publications, present projects and staff. Projects related to horticulture concern the increase of the essential principle of drug plants by cultural practice and breeding and the pathological changes occurring in the storage and ripening of fruits and vegetables.

1356. NEW YORK STATE HORTICULTURAL SOCIETY. 634/635(747)
Proceedings of the N.Y. State Horticultural Society 90th Annual Meeting 1945,
pp. 363.

While much of this report is of local rather than general interest, some of the problems discussed are those which face many deciduous fruit growers. Points considered in different papers include practical considerations on apple scab control, codling moth control, new insecticides including DDT, new apple varieties and spray schedules for different fruits. Short abstracts of others are given separately.

1357. NIGERIA. 633/635(669)
Annual Report of the Agricultural Department Nigeria for 1939/40, pp. 46, ***ditto for 1940,*** pp. 10, ***ditto for 1941,*** pp. 10, ***ditto for 1942,*** pp. 17 [all mimeographed].

These reports (just received) tell the story of agricultural events in Nigeria from the outbreak of war till the end of 1942. The wartime policy is described in some detail in the first report and subsequent reports show how the policy was carried out, so that the Department gradually became essentially a Department of Production and Supply both for native needs and those of troops quartered there. Much research had to be put into "cold store for duration." Brief accounts are given of those items of research which it was possible to keep going. The report for 1943 was again printed and has already been abstracted in *H.A.*, 15: 940.

1358. NORTH CAROLINA. 633/635(756)
Sixty-sixth Annual Report of the N.C. Agricultural Experiment Station **(Research and Farming 1943)**, 1944, pp. 121.

Agricultural Engineering. A new soybean thresher and gleaner which has achieved success is illustrated. *Field Crops.* Cotton, peanuts and soybeans, and tobacco are included. *Horticultural Crops.* The treatment of nematode-infested soil with sodium nitrite, 4 to 8 oz. per square yard, 7 weeks before planting substantially reduced rootknot infection of bean, okra, squash and tomato. Fermate was promising against apple frogeye leaf spot. The use of Shalil rootstock appears to offer the most practical means of controlling rootknot on peaches. Strawberry nutritional studies are in progress. An exceptionally large-fruited dewberry seedling is being tested. Experiments with kok saghyz and with guayule were unsuccessful. Many crops are found to need additional boron in N. Carolina and the effects of its deficiency are briefly noted on the following crops: Sweet potato, cabbage, strawberry, blueberry, broccoli, flowering bulbs.

1359. PENINSULA HORTICULTURAL SOCIETY. 634.1/2(751)
Fifty-eighth Transactions of the Peninsula Horticultural Society, 1944,
1945, pp. 72.

Papers, generally with a discussion, are reported on the following, among other, subjects. *Fruit thinning.* The use of Elgetol for apple and peach thinning shows promise but care is necessary and different strengths for different varieties. *Speed sprayer.* Two seasons' successful use are reported in Delaware apple orchards. *New insecticides, especially DDT, for codling moth.* DDT used at 1 lb. or more per 100 lb. spray gave as good or better control than the control lead-arsenate with nicotine sulphate spray. However, the effect of DDT on predators of mites and woolly aphis would appear to be serious and needs investigation, and the poor foliage and excessive fruit drop on DDT-treated trees may have been directly and/or indirectly due to its use. *Irrigation.* Separate papers are devoted to (1) planning and operation, (2) water supply and equipment, (3) artesian wells for irrigation. *Packing.* A plan is given for the construction of an apple and peach packing house. *Fumigation of apples.* Methyl bromide fumigation caused great (75%) loss by internal brown discoloration and surface scald in Williams apples, but with the same concentration and treatment did not affect Starr, Wealthy and Yellow Transparent apples.

1360. SALISBURY AGRICULTURAL EXPERIMENT STATION (ARNOLD, H. C.) 633/635(689.1)
Annual Report of Experiments at the Salisbury Agricultural Experiment Station season 1943/44.
Rhod. agric. J., 1945, **42**: 129-42.

Brief details are given of trials on the following among other subjects:—effect of manurial dressings on the seed production of soya beans and sunnhemp; varieties of soya bean, potatoes and sweet potatoes.

1361. SIERRA LEONE. 633/635(664)
Annual Report of the Department of Agriculture, Sierra Leone, for the year 1943,
1944, pp. 18, 1s. 6d.

Brief reports of the work of the various agricultural stations are included together with a report from the Irrigation and Drainage Branch. Much of the work is concerned with the extension of rice planting for local consumption.

1362. VILJOEN, P. R. (UNION OF S. AFRICA). 634/635(68)
A review of the agricultural industry. Report of the Department of Agriculture and Forestry [of the Union of S. Africa] for the year ended 31 August, 1944.
Fmg S. Afr., 1945, **20**: 131-93.

Sections IV (Principal food products), and V (Other agricultural products) contain the following points of horticultural interest: *Vegetables*. Supplies met the increased demand without difficulty. It is believed that the prospects for dehydrated vegetables, of which 1,700 tons were produced during the period under review, are very promising. *Deciduous fruit*. The Deciduous Fruit Board marketed 43,000 tons of fresh fruit of which approx. 20,000 tons were grapes. The total yield is specified and the activities of the Board are discussed. *Dried fruit*. The quantity of dried fruit produced in 1944 amounted to about 26,800 tons as against 14,000 tons in 1941. Sultanas and raisins, presenting about 95% of the dried fruit total, were among the few products of which a surplus could not be marketed. *Wine and brandy*. Wine production in 1944 amounted to 450,000-500,000 leaguers (1 leaguer = 127 Imperial gallons) as against 290,308 leaguers in 1939. *Citrus fruit*. The marketing organization of the Citrus Exchange, acting on behalf of the Citrus Board, is described in some detail. An export of 500,000-750,000 boxes of citrus fruit is anticipated. Production figures and price developments are reported also for *tobacco* and *chicory*. In Section VII (Control of agricultural pests and stock diseases) brief mention is made of the research being carried out on diseases and pests of vegetables, plantation crops and fruits.

1363. TEXAS. 634/635(764)
Fifty-fifth* and *Fifty-sixth Annual reports of Texas Agricultural Experiment Station, 1942-1943,
pp. 45.

Notes only are given of progress in the many investigations undertaken by the Texas Station. They include the following:—Breeding hardy citrus. Seedlings of citrange (trifoliate × sweet orange) and citrumelo (trifoliate × grapefruit) have shown wide differences in hardiness within each type, but little difference as between the two types. Deciduous trees tend to be hardier than the partially evergreen. Some citrange and trifoliate stocks are proving successful as rootstocks for Satsuma. A method of growing papayas as an annual is described. Selection has made it possible to grow from seed Devil's Shoestring (*Tephrosia virginiana*) containing 3% rotenone. The possibility of commercial cultivation of *Schoenocaulon drummondii* for the production of a powerful insecticide is being examined. Guayule does well but was killed to the ground by temperatures of 20-25° F. Unsatisfactory yields were given by kok saghyz and krim saghyz. Golden rod made good growth. It has been found possible by breeding to produce peach varieties which combine moderate cold and high heat requirements. Five selections have been made of early white freestones of good dessert quality. Rose cuttings only grew well at a soil pH of 5·2 and over. *Monardia fistulosa*, *Prunus laurocerasus*, *Solidago odora* and *Pucnanthemum incanum* were found to have commercial possibilities as oil plants.

1364. TRINIDAD, IMPERIAL COLLEGE OF TROPICAL AGRICULTURE. 633/635(729)
Report of the Governing Body and Principal's Report to Dec. 31st, 1944.
St. Augustine, Trinidad and Grand Buildings, Trafalgar Square, London, W.C.2, 1945, pp. 27.

Brief notes from heads of department indicate present work. A list of papers published in 1944 is included.

1365. TUCUMÁN. (W. E. CROSS.) 631.153(072)(824.5)
La principal preoccupacion de la estación experimental agrícola de Tucuman, desde su fundación, ha sido la diversificación de cultivos. **(The chief task of the Tucuman (Argentina) research station from its foundation has been to extend the variety of crops cultivated.)**
Circ. Estac. exp. agríc. Tucumán **130**, pp. 7.

A brief summary of the principal activities of the research station at Tucuman since its foundation in 1910.

1366. The following reports have also been examined: (8)

4th A.R. Inst. Agric. Anand, India for 1943/44,
pp. 40.

A.R. Dep. Agric. Basutoland for year ending 30 September 1944,
pp. 16.

Rep. Dep. Agric. Bermuda for 1944,
1945, pp. 11.

50th A.R. Idaho agric. Exp. Stat. for 1942,
1943, pp. 67.

Rep. Dep. Agric. Nyasaland Protectorate for 1943,1944, pp. 15, 2s. 6d.

A.R. Dep. Agric. Sierra Leone for the year 1941,
1943, pp. 10.

A.R. Dep. Agric. Sierra Leone for the year 1942,
1944, pp. 16.

53rd A.R. Washington agric. Stat. for fiscal year ended June 30, 1943,
1943, pp. 163.

N.B.—The 54th report received and abstracted *H.A.*, 15: 945.